

THE
Daily Express
ENCYCLOPÆDIA

VOL. III
CILIA TO EGO

THE
Daily Express
ENCYCLOPÆDIA

*INCLUDING 3500 ILLUSTRATIONS
WITH ATLAS & GAZETTEER INDEX*



VOL. III
CIL to EGG

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ILLUSTRATIONS

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PRONUNCIATION

THE imitated pronunciations are intended to assist the reader in the enunciation of unfamiliar words, and necessarily, especially in the case of foreign words, only afford a rough approximation to the actual sound. The signs used are to be pronounced as follows.—

a	..	as a in hat	o	..	as o in not
ah	..	„ a in father	ō	.	„ o in note
ā	..	„ a in hate	u	..	„ u in but
ār	.	„ ar in hare	ū	..	„ u in tune
aw	.	„ o in more	ur	..	„ ur in lure
e	.	„ e in bell	oo	.	„ u in put
ē	..	„ e in bee	ōō	..	„ oo in boon
ēr	..	„ eer in deer	ou	..	„ ow in now
ē	..	„ { e in herd, or i in bird	ũ	..	„ a in comma
i	..	„ i in bit	th	..	„ th in think
ī	.	„ i in bite	dh	..	„ th in there
īr	..	„ i in fire	gh		„ ch in loch
			zh	.	„ s in pleasure

Other consonants are given their ordinary English sound.

Cilia are hair like processes of the cells of some animal tissues or of a single cell in some Protozoa. Their function is to keep fluids moving in one direction by their sweeping action or to effect locomotion.

Ciliata, a highly organised class of the Protozoa (qv) characterised by the possession of cilia which may be distributed all over the body and act as swimming organs as in the slipper animalcule or may be restricted to certain parts of it as in the stalked bell animalcule in which their action serves to sweep food particles into the gullet.

Cilicia [sili-sia] part of modern Turkey along the S coast of Asia Minor cap Tarsus. It was a Persian province and fell later to Alexander. It became a pirate stronghold then in the 1st cent B.C. fell to Rome and later to the Arabs. In the 10th cent A.D. it came under Armenian influence. In the 19th cent French influence was established but made no headway and the French were replaced by Turkish nationalists after the World War.

Cimabue [from CIMABUO A] Giovanni (c. 1240-1300) Florentine painter and mosaic artist one of the most important figures in the history of Italian art. Very little is known of his life though a number of legends concerning him exist.

Few paintings remain which can be assigned with any degree of certainty to Cimabue. A *Madonna and Child* hangs in the Florence Academy there are others of which the credit is doubtfully awarded to him in the Louvre while at Assisi in both the Upper and Lower Church are works that are probably his. His supremacy as a mosaic artist is revealed by his work in the Pisa Cathedral. While Cimabue can no longer be regarded as the first of the Italian painters as was formerly believed he nevertheless brought the art of painting to a far higher stage of development than that at which he found it and paved the way for the tremendous advances made in the 14th century.

His pupil Giotto learnt much from him.

In Cimabue's own works there is much beauty and strength and the beginnings of a breakaway from the formal rigidity of figure and countenance characteristic of Byzantine art. He shows an interest in individual character in the figures of his prophets and at least indicates human emotions in the groupings and expressions of his *Madonna and Child* compositions while retaining an appreciation of the purely aesthetic qualities of form and design.

Cimarosa Domenico (1749-1801) one of the earlier Italian operatic composers whose works in his time were as popular as they were numerous. He was composer to the Russian court from 1789 to 1793. *Il Mair monio se refo* was his most popular opera during his lifetime and is to-day still the most frequently heard of his works. He died at Venice.

Cimbri, a Teutonic race of unknown origin first emerged in 113 B.C. when they defeated the Romans in Carinthia. They migrated into Gaul where they defeated the Roman consul in 100 and again in 105 (at Orange). They invaded Spain and then with other Teutonic assistance overran Gaul and attempted to invade Italy. Their victorious career was stopped at Aquæ Sextimæ (105) and at Vercellæ (101) when the Romans inflicted decisive defeats upon them. They probably originated from the shores of the North Sea possibly from Jutland which was called the Cimbric Peninsula.

Cimon (c. 505-449 B.C.) Athenian statesman and general. He served at Salamis and as commander of the Athenian fleet and champion of the Delian League defeated the invading Persians by land and sea at the battle of the Eurymedon (466 B.C.). He brought the Greek cities of Asia Minor and the Aegean into the Delian League with which he helped to lay the foundations of the Athenian empire.

Cinchona, a genus of evergreen trees of family Rubiaceæ with lanceol roundish leaves and with

pyramid-shaped panicles. The flowers are yellow or brick-red, and have



Cinchona

India for *Cinchona bark*, from which quinine is prepared

Cincinnati, city in Ohio, U.S.A., on the Ohio River. It is an important commercial centre, whose leading industries are metal goods, soap-making, engineering, foodstuffs, leather goods, and printing. It is a centre of American broadcasting. The city is well planned, on a low hill. Important buildings include the City Hall, Government building, Roman Catholic cathedral with an altar-piece after Murillo, and many great commercial premises, colleges, and schools. There are many parks. Cincinnati was founded in the late 18th cent. Pop. (1930) 451,000.

Cincinnatus (c. 520–440 B.C.), Roman dictator. He held supreme power for two periods of 14 and 12 days respectively, in which he freed Rome from her enemies. On each occasion he refused all rewards, and returned to his farm.

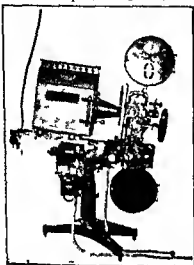
Cinematography, the process by which pictures of motion are obtained by photography and projected upon a screen in such a way that an impression of continuous movement is created in the mind of the observer. Its rapid progress during the last 25 years has been made possible mainly by the constantly increasing perfection of photographic apparatus and materials, especially the invention of celluloid film. Lumière, a young French chemist, invented an apparatus which he called "Le Cinématographe," which enabled him to take a series

of moving pictures upon film which he manufactured himself, and to project upon a screen a positive printed from the original negative film. He opened the first public cinema in Paris in 1895. The principles of his camera have been followed remarkably closely up to the present day. He used film of a width of 35 mm, which is still the standard size for professional cinematography, and the size of each individual picture, or frame, was 18×24 mm as at present. The speed, too, at which he took his photographs, 16 per second, remained standard until the introduction of talking pictures.

Lumière seems to have been inspired by Edison's Kinetoscope, invented in 1880, and first placed on the market in 1894. Edison, using the newly invented Eastman film in strips of c. 50 ft, constructed a kind of peep-show in which one person at a time could look at a series of moving pictures of people or objects, lighted from behind, and turned by a crank. Before long attempts were made to employ strips of film of greater length and to devise a more effective projector. One of the main obstacles to progress was the inflammable nature of the film itself, and development was delayed for a while by the terrible loss of life at a charity entertainment in Paris in 1897, where nearly 200 people were burnt to death when the film being exhibited caught fire.

The earliest films were mostly documentary, but shortly after the beginning of the present century attempts were made to develop the *story-picture*. These began as crude one-reel films of a lurid nature with bandits, robbers, cowboys, and comedians. Their length was seldom more than 1000 ft. In 1908, D. W. Griffith, who had been an actor, was given an appointment by the American Biograph Company of New York, and the film as we know it to-day probably owes more to his foresight than to any other single factor. His influence was felt at a time when the commercial

possibilities of cinematography first began to be appreciated. As film companies multiplied on both sides of the Atlantic producers became more



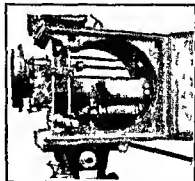
Noted **Projected**

ambitious. In France Louis Mercanton produced *Queen Elizabeth* with Sarah Bernhardt in the title role. This film created a sensation in America when shown by Adolph Zukor. Italy in 1913 was responsible for another spectacular film *Quo Vadis?* Then in 1914 Griffith produced the epoch-making *Birth of a Nation*.

The Americanisation of the cinema due largely to the lead gained by American producers while the World War checked development in Europe has been characterised by remarkable improvements in technique and also by a tendency to star individual actors and actresses rather than trouble unduly about the quality of the play in which they appear and to stress rather the magnificence and expense of a production than its artistic qualities. None the less especially in the last few years higher standards have undoubtedly been set.

up there has been a greater realisation of the possibilities and limitations of the film as a medium for artistic expression no less important and significant than literature and the theatre and a fuller appreciation by the general public of good work when it has been presented to them. The sudden development of *talkies* in 19-7 stimulated further experiments and to some extent led to a revaluation of film possibilities.

The Process The first apparatus served as both camera and projector. To-day infinitely more elaborate apparatus is used and the two functions have been divided. The cinematograph camera has the essential features of all other cameras: a lens (rather a battery of lenses), a shutter, a magazine containing the sensitive material, the film and a device for focusing. In addition it is provided with a mechanism for exposing individual frames. Negative stock 35 mm wide is used, supplied in rolls of c 400 ft or less. It is perforated along both edges, the perforations being invariably 4.75 mm.



1 t m haulm of Deb i S per F w r
C m ab w i g per i allen i g d i wh i h
all w i th b i n g t b e d i s p e n s e d w i th

apart. These perforations are engaged by the feeding mechanism which carries the film forward from the full spool brings it for exposure before

the lens, holds it there stationary for the necessary period of exposure, and then takes it on to a second spool. The standard rate of exposure is 24 pictures per second, but slow-motion pictures can be obtained by filming at a much more rapid rate—a Japanese film of a rifle bullet in flight was taken at 10,000 per second. The shutter itself revolves, and as it cuts off the light, moves the film forward a single frame, leaving an unexposed frame in position for the next opening of the shutter. When a complete length of film has been exposed, it is wound upon a frame in the dark room and immersed in a tank containing developer. It is afterwards fixed and washed as with the ordinary hand-camera film, and finally is dried with special care by winding upon a large drum. This is driven by a motor which rotates it rapidly, throwing off the water by centrifugal force, while the movement through warm air quickly and evenly dries the emulsion. Elaborate machinery is now largely used to carry out each stage automatically, and can deal with 50,000 ft. of film a day.

But this is only the negative. If it were projected, dark objects would appear light on the screen, and *vice versa*. The shading of the negative must be reversed, and this is done by printing from it a positive. The negative is very carefully examined, any defective portions are removed, and the various sections joined together again. It is placed in a machine with a mechanism similar to that which originally carried it through the camera, together with a film coated with a much slower emulsion, and frame after frame is exposed by a shutter, each revolution of the shutter being synchronised with the feeding device. As in the case of the camera, too, it is possible to vary the length of exposure, according to the nature of the negative. It is now possible to secure, by automatic means, the exposure desirable for different parts of a film varying in density. The

printed positive film is developed and fixed, then dried, as with the negative.

The next stage is that of projection. In its simplest form, the projector is based on the same principle as a magic lantern, again with a feeding device which brings the film before the source of light at a regular speed, while a shutter prevents the image from being projected except while it is momentarily at rest. In practice a great number of accessory devices are employed to guard against the film catching fire, to secure steadiness of projection, uniformity of lighting, etc.

Sound Films. The system for reproducing sound now favoured is the *sound on film* system. Sound consists of a series of vibrations which can be collected by a microphone and transferred, as electrical impulses, to an amplifier. This is the basis of wireless. But for sound cinematography these impulses must be recorded and transformed into light fluctuations. The sound-recording instrument is actually a camera without a lens, containing a light globe which varies in luminosity in response to the changes in electrical current which come to it from the amplifier. It also contains a roll of negative film which passes through it at exactly the same rate as the film which is taking the picture. But the film in the recording instrument, through a slit, receives only the impressions brought about by the fluctuations in the light globe, and these are confined to the *sound track*, which runs down the side of the film, $\frac{1}{8}$ in in width. The image of sound thus produced takes the form either of bars across the track corresponding in density to the degrees of fluctuation in the sound, or of jagged edges, like those of a saw, whose height and depth mark the degree of fluctuation. The recording instrument and the actual camera work at exactly the same speed, and the two negatives are printed at the same time on the one positive, but the sound is actually several frames away from the appropriate picture.

For reproduction the process is the

reverse of recording. The projector provides that the sound track passes before an optical slit behind which is a lamp which shining through the variations in that track reproduces the light fluctuations. These in turn are transformed by a photo-electric cell (v) into electrical impulses which are conducted to loud speakers placed behind the screen. As the action photographed is reproduced before the audience the sound that accompanied that action is reproduced simultaneously.

In the early days of sound films some difficulty was experienced in getting rid of the sound made by the running of the camera. To secure perfect synchronisation it was essential to employ motors which made a noise. The problem was solved by operating the cameras from sound proof booths but these booths greatly interfered with the mobility of the camera. Then silencing devices were fitted blimps—rather like an elaborate hat case—being mainly favoured.

When it has not been possible to make both a sound and a visual record *post synchronisation* is often employed. Musical accompaniment is thus *post synchronised* as with the well known Mickey Mouse cartoons and Silly Symphonies. Many familiar noises are reproduced by means of *effects*. Sometimes even speech is *post synchronised* though the necessity of following lip movements makes this particularly difficult. The work is carried on in a studio with a screen on which the picture is shown those making the effects or speech watching it very closely and accompanying each movement as required. Considerable rehearsing is necessary. The sound is recorded and printed on a film in the ordinary way.

Making a Film. The first requisite of any feature film is a story which may be adapted from a play or a novel or invented directly for the screen. A great deal of elaborate work has to be done between the birth of the original idea and its final appear-

ance on the screen. The film as we see it consists of a great number of *shots*—series of photographs of a single scene in progress taken from different camera positions. All these shots must be planned and written down in a *scenario* which is so to speak the manuscript of a film. They are in fact written down in order but for the sake of convenience it is customary to photograph these scenes which take place in the same *location* one after the other irrespective of their place in the film story. Many devices are employed to ensure the smooth merging one into another of the different shots so that the audience is hardly aware of the transitions but regards the story as flowing straight on without a break (*see CINEMATOGRAPHY TERMS EMPLOYED IN*).

Armies of people are employed in a modern studio—scenario writers, producers, directors, cameramen, engineers, scene painters and constructors, electricians, property men and of course both stars and supers. The sums spent in producing a big film are stupendous. Vast quantities of negative stock are exposed which are never screened for the public and many films are produced which never find their way to the theatres at all.

There has developed around the production, marketing and renting of films a very great and important industry particularly in the United States. To some extent this has resulted in attention being given to profit rather than to artistic merit. On the other hand competition has led to much excellent work and film producing firms vie with one another for the best stars and the most original and effective directors.

Films and Education. Films are being used increasingly in the field of education as moving pictures impress the youthful mind far more vividly than any school room teaching especially if accompanied by appropriate explanation. Industrially the moving picture is useful for the study of human and mechanical motions. F

it is often convenient to take the film at a very high speed and run it through the projector at normal, thus "slowing down" motions too rapid for the eye to follow, until they can easily be studied. A close-up cinematograph view of an exceptional worker in action may reveal some peculiar knack or motion which can be taught to other operatives, thus speeding-up production. The principle has been applied to celebrated sportsmen, e.g. golfers in the act of playing. A careful analysis of the action, slowed down so that the eye can appreciate every detail, has been used to improve the technique of younger players.

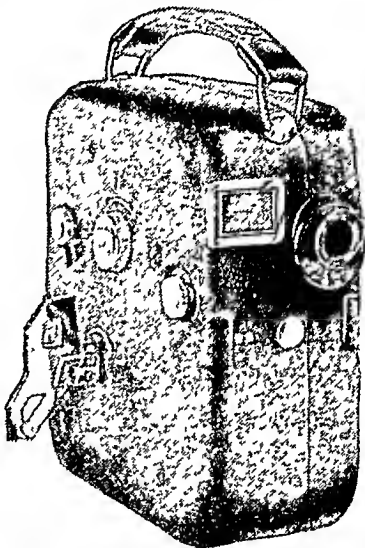
Well-equipped scientific laboratories record movements of tiny organisms under the microscope, which can be measured and studied afterwards. Hospitals sometimes take motion pictures by means of X-rays.

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Cinematography, Amateur Small cinematograph apparatus is remarkably simple and easy to handle by an amateur, the technical work in processing (i.e. the making of a positive ready for projection) being undertaken by the film manufacturer at a cost included in the price of the film. A few advanced amateurs use apparatus and material of standard size (35 mm.) and one or two cameras on the market are designed for their use. For the most part, however, a narrower film is employed.

There are now 3 principal sizes at the disposal of the amateur, 16 mm., 9½ mm., and the recently introduced 8 mm., marketed by one manufacturer. In the case of the first-named, the actual picture measures 7.6 × 10.5 mm., and of the second, 6.5 × 10.5 mm. The 16 mm. film is perforated on both sides after the manner of standard film, whereas the 9½ mm. film has a single perforation between each frame. The 8 mm. size is taken on 16 mm. film in a camera which uses only one half of the film at a time, afterwards exposing the other half

The makers, when processing the last-mentioned film, divide it into its two halves and join them up in a single long strip before returning it. Each particular size has its adherents, but all are capable of giving excellent results with the admirable projectors now available. It is now possible to obtain projectors for 16 mm. film which will enable a picture 15 ft. square to be thrown on the screen.



Pathe 9½ mm. Camera

large enough to be seen by some hundreds of people. Even the 8 mm. size will give a picture entirely satisfactory for home use, though the camera which employs it is small enough to be slipped into the coat pocket. The smaller size is appreciably cheaper.

Amateur cinematograph apparatus follows the lines of that used by professionals. The simplest types usually expose 16 frames per second, and are fitted with a 3.5 anastigmat lens, but apparatus can also be obtained permitting the use of interchangeable lenses differing in rapidity and focal

length. Some models are fitted with a turret head allowing for the provision of 3 lenses the particular lens desired being brought into position by revolving



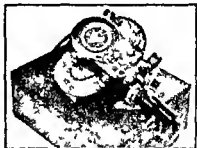
16 mm. Cine hod k 8 mm.

the turret. These types also usually provide for a number of speeds varying from 8 frames per second to 64 the latter giving the effect of slow motion. They are driven by a spring motor. Quite recently two at least of the most prominent firms producing amateur apparatus have brought out semi-professional models in which most of the devices employed by professional cinematographers are incorporated. These are likely to be used mainly for such purposes as scientific and especially medical cinematography surgeons having found cinematograph records of operations extremely valuable for teaching purposes.

The film most commonly used by amateurs is known as *reversal stock*. It can be bought of varying speeds (i.e. sensitivity) and in both ordinary and panchromatic varieties. Films of particularly fine grain are also obtainable. They are non-inflammable and may be obtained in spools or in specially designed chargers. They can be loaded into the camera in daylight. After exposure they are returned to the makers for processing the negative after development being reversed i.e. itself made into a positive. The disadvantage is that only one copy of a particular film is available and when that is worn out the film is done with. However if desired the film may

merely be developed and several copies made. Processing of reversal film can be done by the amateur himself but the process is anything but easy and he is hardly likely to have facilities for doing the work so well as the manufacturers. Ordinary negative stock is also obtainable and the negative secured is thereafter available at any time for as many copies as the user may desire (see CINEMATOGRAPHY).

The number of excellent projectors on the market are also based on the same principles as professional apparatus. Many firms have film libraries whereby professionally made films are by reduction made available for amateur users. The latest development along these lines is the provision of a new reel service for owners of 16 mm projectors.



Victo Cam with e l n g l l ret.

Provided reasonable care is taken not to expose in too dim a light to maintain uniform rate of movement of the handle (irrespective of the rapidity of the movements of the subject (if no motor is fitted) and to choose the correct subjects to record no difficulty should be experienced in taking films. Much of the interest to the amateur lies in the editing, titling and preparation of the positive for exhibition. If no running commentary is offered as the film runs it is well to provide some form of soft musical accompaniment as a background to the show. Travel films offer a wide field for the non-professional worker. Much is possible by co-

operation with others in sharing films and so increasing widely the variety and number of subjects illustrated

Up to the present, the reproduction of sound in connection with the amateur film has been mainly confined to disc or gramophone reproduction, the gramophone being geared to the cinematographic apparatus to secure accurate synchronisation. Experiments are, however, being continued with the professional system of sound on film

A number of amateur societies have come into existence for the encouragement of amateur cinematography, the members often combining in production. The Institute of Amateur Cinematographers, whose headquarters are at 7 Red Lion Square, London, W C 2, aims at co-ordinating the activities of such societies and generally at furthering the interests of amateurs

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Cinematography, Glossary of Terms used in.

Art Department the section of studio organisation whose function it is to design, erect, decorate, and furnish sets (see below) either inside the studio or in its grounds. It employs artists, architects, and experts of various types, who first design the sets, then make models of them, which are afterwards reproduced in full size in the workshops

Blimp a device for preventing the sound involved in the working of a camera or sound-recording instrument from becoming perceptible to the microphone

Camera Angle the position from which a scene is photographed, depending largely upon the effect it is desired to produce in the mind of the cinema audience

Caption explanatory matter photographed as printing

Close-up: a shot taken at close range, or by telephotography, for purposes of emphasis

Composite Shot a number of separate shots taken on the same strip of negative

Continuity the process of keeping the thread of the story throughout the film, and from shot to shot

Cutting joining one strip of film to another bearing an entirely different picture. By this means an alternation of pictures produces a rhythm which has the effect of making the sequence of events much more vivid than a series of very long strips showing the action in full could possibly be. Pudovkin has made very effective use of this process

Director the actual creator of the film, whose business it is to secure the most effective presentation of the idea underlying it. Notable directors are Anthony Asquith, Cavalcanti, Chaplin, Griffith, King Vidor, René Clair, Ernst Lubitsch, Pudovkin, Eisenstein, Erich von Stroheim, G W Pabst, F W Murnau, E A Dupont, R Flaherty, and F Lang

Dissolve the gradual change from one picture to another in which the first picture gradually disappears while the second seems to appear through it

Editing the process of constructing a complete film from its elements and making a coherent whole

Effects sounds produced artificially to represent the noises which should accompany action in a film, e.g. the galloping of a horse, the starting of a railway train, or the cheering of a crowd. They are frequently used when a silent film is post-synchronised

Fade-in and Fade-out the gradual appearance or disappearance of a picture on the screen, used usually to mark the beginning and end respectively of a new sequence

Flash a very short cut shot, i.e. a strip of film which begins and ends abruptly

- Flat** a piece of scenery out of which the main elements of a scene are built up
- Flying Shot** a shot taken with the camera suspended over the heads of the characters.
- Footage** the amount of film expended in the taking of a film. This may vary from c 1000 ft the average length of a reel to over 10 000 ft. It takes c 11 minutes to show 1000 ft of sound film.
- Frame** a single picture recorded on a strip of celluloid film. In a talking film, 24 such frames are exposed each second.
- Insert** a shot of some written or printed matter such as a letter or a newspaper advertisement which it is necessary for the audience to read.
- Location** any place outside the grounds of a studio used in the taking of a film.
- Mix** a mix produces the same effect as a dissolve (q v) but is produced by chemical means.
- Mixing** in the production of a sound film a number of microphones are used in each scene and it is necessary to control the volume of sound transmitted from each so as to secure the required general effect and balance. The recording engineer must by mechanical means produce this effect. This he does by the use of a volume-control board which has a dial for each microphone.
- Montage** the very important process of assembling different sections of film so as to secure a desired effect especially in the tempo of a film.
- Pan Shots** panning i.e. moving the camera either vertically or horizontally during the taking of a shot from the same position is used when following movement, as in motor or horse racing or in the case of a rising aeroplane. It is used in interiors to produce the effect of a figure coming into view.
- Panchromatic Stock** negative material sensitive to a wider range of light than ordinary stock and consequently giving a truer representation of colour value.

- Positive Film** the stock upon which the actual picture projected is printed from the original negative.
- Producer** the chief executive of a producing company who determines the policy to be followed in the making of a film.
- Scenario** the book of the film. The director finds in it the story of the film arranged in shots scenes etc. together with a description of the pictures required and details of the setting. The position of the camera also is indicated.
- Sequence** a section of the film narrative i.e. a series of connected shots dealing with one incident or phase of the story.
- Set** the room building or street constructed for purposes of a scene. Such a set may represent either an interior or an exterior scene.



A Set "at Elstree"

- Shot** the series of photographs taken during a single run of the camera.
- Shooting** is the act of taking the film.
- Soft Focus** the soft effect produced either by the use of a special lens or by photographing through gauze.
- Still** photographs of a particular scene taken during production with an ordinary camera and used to advance the film. Stills can be made by enlarging a single frame but the degree of enlargement involved in such a case is apt to produce a grainy effect.
- Synchronisation** the process of securing

ing the accompaniment of sound to action with precise accuracy

Throw the distance between the projector and the screen in a cinema

Tracking the moving of the camera upon a special truck during the actual process of photography

Cinematograph Films Act, 1927, an Act which provides that British renters of films must include in their output a certain proportion of films made in the Empire. It came into operation on April 1, 1928, and will remain in force until March 31, 1938. The so-called "quota" is arranged on a sliding scale. It began with a percentage of 7½, increased to 12½ in 1932. The highest quota (20 per cent) will be reached by 1936. Exhibitors of films have a similar quota, compelling them to include in their programmes a percentage of British films. In 1929, this proportion was 5 per cent. By 1933 it reached 12½ per cent. It is to be 15 per cent in 1934-5, and 20 per cent in 1936-8.

The law provides that the author of the scenario must be British, that the studio scenes must have been photographed in the British Empire, and that the film must have been made by British subjects or a British company. Moreover, 75 per cent at least of salaries, etc., must have been paid to British subjects, though the Board of Trade may, in certain circumstances, allow this amount to be reduced to 70 per cent. The Act does not apply to news films, travel films mainly concerned with natural scenery, educational films used for educational purposes, advertisements, scientific films, and films depicting industrial and manufacturing processes.

Cineraria, a very popular greenhouse annual, easily grown, and producing masses of handsome blue, violet, rose, and white flowers. Cinerarias are also used for bedding plants in the late spring.

Cinnabar, sulphide of mercury, and the only important ore of the metal. It is conspicuous by its weight, softness, and bright red colour. It may

occur in minute crystals in cavities, but is usually massive in veins, mostly in slates and limestones. Its chief localities are Spain, Italy, and the United States. Besides yielding most of the mercury of commerce, cinnabar is used as "vermilion" paint.

Cinnamic Acid, or phenylacrylic acid, a white crystalline organic compound with melting-point 133°C and boiling-point 300°C. Its formula is $C_6H_5CH=CHCOOH$. It is found in nature in combination in some balsams such as Peru balsam. It is, however, usually prepared synthetically by heating benzaldehyde with sodium acetate in the presence of acetic anhydride. This is the "Perkin reaction." Cinnamic acid is used in perfumery.

Cinnamon, see SPICES AND CONDIMENTS

Cinnamon Stone, see GARNETS

Cino da Pistoia [*pron.* CHE'NŌ DAI PISTOI'À] (1270-1336), Italian poet and jurist, one of the great immediate predecessors of Dante (*qv*) in the history of Italian poetry (the other being Guido Cavalcanti (*qv*)). He was the author of a number of sonnets and canzoni, of which many are translated into English verse in D. G. Rossetti's *Early Italian Poets*, and of a *Commentary* on the Justinian Code (1314) and other legal works.

Cinquefoil, the English name for a genus (*Polentilla*) of the family Rosaceæ, the flowers of which resemble the strawberry, but do not have a fleshy receptacle for the seeds. Strawberry-leaved cinquefoil has a putate stem, ternate leaf, and white petals. *Creeeping Cinquefoil* has large handsome yellow flowers, on long stalks, and is common in meadows. *Hairy Cinquefoil* has pinnate leaves, with down underneath the leaflets, and small yellow flowers, and is found on gravelly soil. *Silverweed* (*qv*) belongs to the same genus. Many species are very suitable for rock-gardens.

Cinque Ports, The, originally five ports (Dover, Hastings, Romney, Hythe, and Sandwich) in the S.E. of England, which, during the 13th cent

in return for certain privileges were bound to provide ships and men for the defence of the Channel. Winchester and Rye were later added as "Ancient Towns" and various smaller ports as "limbs" or members of one or other of the Cinque Ports, thus Gillingham (Gillingham) was a limb of Hastings, Folkestone of Dover, Ramsgate of Sandwich, etc. The titular office of Lord Warden of the Cinque Ports has been held by the Constable of Dover Castle for many years.

Cintra [sɪˈntrə] Portuguese town a few m. N.W. of Lisbon among forest-clad hills; it has been described by both Byron (*Caïde Haïd*) and Camoens. On the hills is a large Moorish fort and a ruined mosque, while in the town itself the Royal palace and Penha Verde are notable. The Montserrat palace was built for the Englishman William Beckford. By the Convention of Cintra (1808) the French agreed to evacuate Portugal. Pop. c. 8000.

Cipriani [ˈsɪprɪˈni] Giovanni Battista (1727-1885) an Italian engraver and decorative painter born in Florence but mostly resident in England. He painted ceilings and decorations in a number of important London buildings including the Albany and Buckingham Palace, and he designed the carvings at Somerset House, where he also did some paintings. Specimens of his drawings are in the Victoria and Albert Museum.

Circassia, see CAUCASIAN AREA.

Circe [sɪˈseɪ] legendary sorceress, daughter of the Sun. She lived on the island of Aia [EEA] where she enchanted Ulysses's companions and changed them into swine, but Ulysses forced her to restore them.

Circle, see GEOMETRY.

Circuits, certain divisions of England and Wales appointed to be visited by a judge twice a year or more often for the purpose of administering justice on a commission of assize (qv). There are now 7 circuits: the N. E. Midland, S.E., Oxford, W. N. and S. Wales,

Circular Note, note issued by banks for the use of travellers which can be cashed at the offices or the correspondents of the bank. Such notes are accompanied by a *Letter of Indication* giving a specimen of the holder's signature and the numbers of the notes. The holder should carry the Letter of Indication and the notes separately, since if lost together the finder, by forging the signature, might cash the notes.

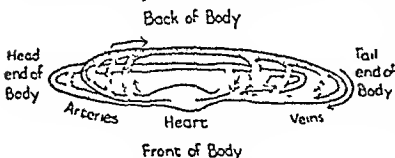
Circular Notes are usually in £5, £10, £50 or £100. They are similar to *Travellers Cheques* issued since 1891 in the United States for \$10, \$20, \$50 and \$100 and by some English banks for convenient denominations such as £5, £10, etc. Another type of facility for travellers is the *Letter of Credit* (qv).

Circulating Medium, see MONEY, BANKING AND CREDIT.

Circulatory System (1) *In Man* the circulatory system has become very elaborate although when it first came into being it took the very simple form still seen in the early stages of the developing human embryo. The simplest type of system consists of a continuous tube analogous to the inner tube of a motor-car tyre. At one point of the tube the walls are thickened by the development of much muscle tissue. The muscular tissue undergoes repeated and continuous contractions and imparts a pulsating movement to the tube and this causes the contained fluid to move along and around and back again. The part of the tube which is thickened and pulsating is really the primitive heart, the part in front of this being called Artery and the part behind Vein.

In the human embryo the circulating tube becomes split into two parallel tubes by the development of a longitudinal septum between the roof and the floor. The two tubes thus formed remain together in the region of the heart but in the part of the system diametrically opposite to the heart they are separated and in fact lie on each side of the body. In the next

stage of development, short cut, are formed in the arterial side of the system, as represented by dotted lines in the diagram. These take the form of a number of arches, and they are situated, in the embryo, on each side of the



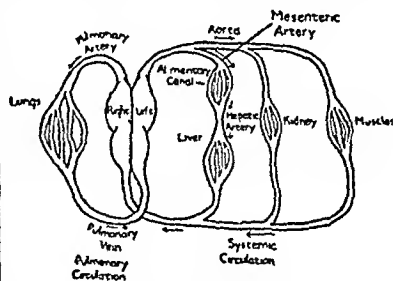
Circulation in Human Embryo

shoulders and neck. Associated with these arches is the apparatus for absorbing oxygen, which, in the case of man, takes the form of lungs. In passing through the lungs, blood takes up oxygen from the air, and is then conducted by veins back again to the heart. But this time it passes through the left side of the heart, and from there it is driven forwards into another artery, which splits up and conducts it to all parts of the body. When it has given up its oxygen to the body tissues, the blood is again collected into veins, and these lead it back once more to the right side of the heart. Thence it goes once more to the lungs, and the cycle begins again.

The details of the nature of the communications between the arterial vessels and the venous are represented diagrammatically in the illustration, and the vessels appear there to communicate directly. But this is not quite what happens. From the foregoing description, it will be seen that an artery is a vessel conducting blood to an organ or structure in the body such as, for example, the muscles or the alimentary canal, while a vein is one which conducts blood away. Now, when the artery arrives at the organ which it is supplying, it breaks up into smaller vessels known as Arterioles, and these in turn break up until we get to very small vessels indeed, namely, Capillaries. These are very numerous, and their walls are so very thin that oxygen and other

substances can diffuse into the tissues very quickly. These capillaries then run together, forming the roots of larger vessels known as Venules, and these, in turn, fuse until we get to the large vein of which we have already spoken. This is known as the *Capillary System*, and we have quoted two examples of organs in which the process takes place, namely, the muscles and the alimentary canal. These two examples serve as a basis for two further subdivisions of the circulatory system.

Blood which has passed from the right side of the heart through the lungs and back to the left side of the heart, has passed through what is known as the *Pulmonary Circulation*. When it leaves the heart again, to go round the body, it enters what is known as the *Systemic Circulation*, and this systemic circulation has two different routes. Half the blood enters an artery—a *Mesenteric Artery*—which leads to the alimentary canal; when it has passed through the capillary system of the canal, it flows into a vein known as the *Portal Vein*, which carries it to the liver. Inside the liver it again splits up into what is known as the *Hepatic Capillary System*, after which it leaves the liver



Circulation in Man

by a large vein known as the *Hepatic Vein*, to return again to the heart.

The other half of the blood, on the other hand, proceeds on its way from the heart down the main artery of the body—the *Aorta*—being thence conducted by various branches to all the

muscles of the body. We may note in passing that it is one of these branches which also serves the kidneys. As before the blood is conducted back from the capillary systems of all these organs in veins. These join the hepatic vein and with it flow on again to the heart.

(2) *In Animals* Apart from a few variations of no great importance the heart blood vessels and lymphatic vessels in all the orders of Mammalia closely resemble those of man as described above. The only variations that need be noticed are the presence in the elephants rodents and monotremes (q q v) of two anterior veins

the presence in the Echidna (q v) of an anterior abdominal vein opening

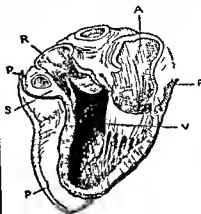


FIG. 4.—Interior of the left side of the heart.

P Pulmonary artery,
V Ventricle,
A Auricle,
R Aorta,
S Septum.

into the liver as also occurs in some more primitive vertebrates.

In birds as in mammals the blood is warm the heart consists of four chambers and the left ventricle and the aorta rising from it contain only pure blood. The aorta however arches over to the right side instead of to the left. In the heart itself the valve at the orifice between the right auricle and ventricle is not tricuspid as in mammals but is a strong muscular flap the corresponding valve on the left side being membranous. The heart beat is more rapid than in mammals. The carotids run side by side along a channel on the under side of the neck bones and sometimes only one is found. As in a few mammals mentioned above and in reptiles there are two anterior veins cavæ and one posterior opening into the right auricle.

A distinctive feature of the heart of reptiles is the presence of two aortic arches a right and a left rising close

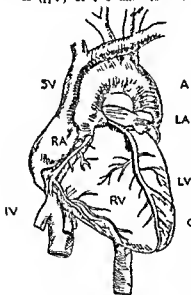


FIG. 3.—The Heart and its Vessels.

RV Right Ventricle,
LV Left Ventricle,
LA Left Auricle,
C Coronary Artery,
SV Superior Vena Cava,
IV Inferior Vena Cava,
A Aorta,
RA Right Auricle.

cavæ as in some of the less highly organised classes of vertebrates and

together, and crossing a short distance above their point of origin. Above the heart they converge and, meeting beneath the spine, unite and pass backwards as the dorsal aorta, which in its course gives off branches to various organs of the body. The head is supplied by branches from two carotid trunks, which arise close together from the right aorta near the point where it crosses the left. The carotids carry pure arterial blood to the head, whereas mixed arterial and venous blood is taken to the greater part of the body. This is a very different arrangement from that which obtains in mammals and birds, in which the single aortic arch receives only pure blood from the heart, and the difference is due to the different construction of the heart in reptiles.

longitudinal vessel, which, passing both forwards and backwards, unites with

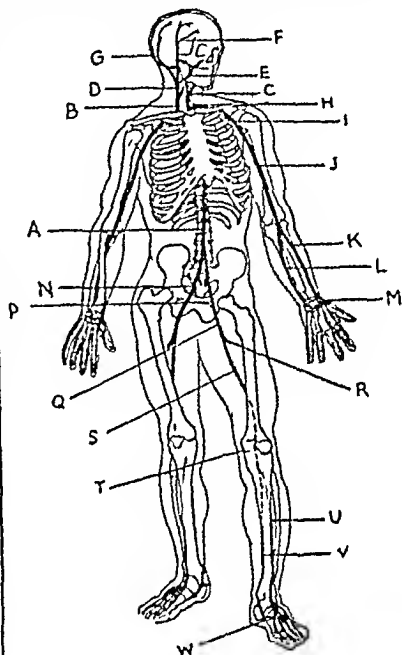


FIG 5.—The Arteries of the Body.

- A The Aorta
- B Common Carotid Artery
- C Internal Carotid Artery
- D External Carotid Artery
- E Facial Artery
- F Temporal Artery
- G Occipital Artery
- H Subclavian Artery
- I Axillary Artery
- J Brachial Artery
- K Radial Artery
- L Ulna Artery
- M Palmar Arches and Branches to the Fingers
- N Common Iliac Artery
- P External Iliac Artery
- Q Common Femoral Artery
- R Deep Femoral Artery
- S Superficial Femoral Artery
- T Popliteal Artery
- U Anterior Tibial Artery
- V Posterior Tibial Artery
- W The Plantar Arch and Branches to the Toes, etc

its fellow of the opposite side to supply the head in front and to form the dorsal aorta behind.

In the Amphibia, at least in the higher forms, such as frogs and toads, the distribution of the pure, mixed, and impure blood to the tissues is as in reptiles, but the mechanism of distribution is different and more complicated, particularly in the elaboration of the valves of the heart and great vessels. The heart consists of two auricles, a ventricle and the sinus venosus, as in reptiles, but it has an additional structure, the conus arteriosus, between the ventricle and the ventral aorta, the common trunk from which the aortic arches, the carotids, and the pulmonary arteries rise. Hence the heart is sometimes said to be five-chambered.

In the gill-breathing larvæ of amphibians, such as the tadpole of the frog, the circulatory system is on the same plan as in fishes. The conus arteriosus leads into a long ventral aorta, from the end of which arise three pairs of vessels in the early three-gilled stage, and four pairs in the later four-gilled stage. These vessels, called afferents, pass to the gills, where they break up into capillaries for the oxygenation of the blood, which is then collected into a corresponding series of efferent vessels. These join to form above the gills on each side a

When the gills with their capillaries disappear the afferent and efferent vessels unite to form four pairs of gill arches and the lungs when developed are supplied by branches from the fourth arch which becomes the pulmonary artery of the adult frog. The third arches disappear the second become the aortas and the first the carotids.

The circulation in fishes resembles in a general way that of the amphibian tadpole the blood passing from the heart through the gills and thence to the body making a single circuit instead of a double circuit through the lungs as well as through the body. The heart consists of a single auricle and ventricle both sometimes incompletely divided a sinus venosus and sometimes as in the sharks rays sturgeons and others of a muscular conus arteriosus supplied with several rows of valves and sometimes divided into a right and left cavity as in adult amphibians.

In the Arthropods the circulation is of the open kind as in Mollusca the blood passing from arteries to veins when present through wide spaces. Its mechanism is as a rule better developed in the water breathers than the air breathers. In the air breathing insects centipedes etc it consists of a dorsal segmented heart each chamber having a pair of orifices by which blood is returned from the pericardium. The only important vessel is an anterior aorta along which the blood is driven before passing into the wide spaces whence it is returned to the pericardium. A complicated circulatory system is unnecessary on account of the high development of the breathing tubes which carry air to all parts of the body. But in the scorpion in which the breathing organs are small lung sacs the arterial system is much more complicated and the blood is ultimately collected in a ventral reservoir passed over the lung books and returned to the pericardium by definite veins. In the king crab which breathes by gills the circulatory

system is very similar to that of the scorpions.

In the Crustacea the circulatory system is very variable being altogether absent in some degenerate forms.

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Circumcision, removal of the fore skin is an operation performed as a ritual or for medical reasons. As a ritual it is carried out at an age varying from 8 days among the Jews to adolescence among the Basutos and Melanesians. It was practised by the ancient Egyptians and is found among Mohammedans and negroes but not among the Mongolians. The Feast of the Circumcision to celebrate the circumcision of Christ is held on Jan 1 in Roman Catholic Anglican and Eastern Churches. Medically the reason for circumcision is cleanliness and it is effected in the infant as a preventive measure or if necessary later in life in the treatment of certain diseases.

Circumnavigation the process of sailing round especially applied to voyages round the world. A Portuguese Ferdinand Magellan led the first expedition to circumnavigate the globe in 1519 and though he himself was killed 31 of his company completed the voyage in about 2 years and 10 months. Drake (1577-80) Bougainville (1766) and Captain Cook (1768-9) also made the same voyage. The German airship *Graf Zeppelin* flew round the world in 1929 in 3 weeks and in 1931 Post and Gatty circled the earth in an aeroplane in 8½ days a feat improved upon by Post who in 1933 flew alone round the world in 7 days 18 hrs.

Circus (Gk. *kirkhos* = a ring) in Roman times a semi-circular building with an arena surrounded by tiers of seats for spectators for the holding of various spectacular displays especially chariot racing. The *Circus Maximus* near the Palatine Hill had accommodation for 150 000 s.

the Emperors the circus became a conspicuous feature of Roman life, and the idle city populace was kept in good humour by a constant supply of "bread and circuses". The modern circus consists mainly of equestrian and acrobatic performances, performing animals, etc., interspersed by the comicalities of clowns, which have always been an important feature. Among the earliest of English circuses were those kept by Philip Astley (d. 1814) and Durov, and the travelling circus which gave its performances in an enormous tent set up in any convenient open space flourished exceedingly during the 19th cent. under such celebrated showmen as P. T. Barnum and "Lord" George Sanger. The popularity of the circus has somewhat diminished with the growth of the cinema.

The name has been applied in England to certain important cross-roads in large cities, such as Oxford Circus and Piccadilly Circus in London, where the plan is roughly circular.

Cirencester [sɪs'-ɪt-ər or sɪs'-ɪs-tər], small Gloucestershire town on the R. Churn, in an agricultural district, with an important market. Interesting buildings include the 12th-cent. Parish Church of St. John the Baptist. Cirencester was formerly an important woollen centre. The Royal Agricultural College is just outside the town. Pop. (1931) (rural dist.) 12,179.

Cire perdue [sɛr pɑrdʊ] (Fr. for "lost wax"), a method of casting bronze or other metal statues. It was employed by the sculptors of the Renaissance, and is described in detail by Cellini, but it was probably known also to the Egyptians, Greeks, and Romans. The statue, or object to be cast, is modelled in clay, and then coated with wax to which the sculptor gives the exact form and finish required for the bronze. A thin, smooth paste, made from clay, ashes, and ground brick-dust, is then applied carefully to the surface and covered with a thick layer of clay; vent-holes are left open,

leading to the wax, and small metal rods are driven in so as to preserve the relative position of the outer and inner layers of clay. After reinforcing the mould with metal hoops the whole is then baked, during which process the wax escapes through the vent-holes, leaving a hollow, into which melted bronze is poured. After allowing time for the metal to cool the outer mould is broken away and the inner core chipped out. Such a bronze cast requires little finishing or polishing, and has the advantage of economising metal, since the completed statue is composed of a thin, hollow layer. *See also BRONZE AGE, CASTING OF METALS.*

Cirromancy, *see* DRACONOCALY.

Cirrus, *see* CLOUDS.

Cisalpine Republic, formed in N. Italy, in 1797, after the French campaign, with a constitution resembling that of the French republic. In 1802 it was forcibly merged by Napoleon in the Italian republic, and later became part of the Italian kingdom founded by Napoleon in 1802.

Cistercians, a Roman Catholic Order of Monks founded in 1098 by St. Robert at Cîteaux, France, who observe strictly the rule of St. Benedict (*q.v.*). Their rule enforces silence and manual labour, especially in the fields. St. Bernard of Clairvaux was the most famous member of the Order, from which, in the 17th cent., sprang the *Trappists* or reformed Cistercians.

Cistus, the rock-rose genus, including a number of beautiful wild and cultivated plants. The common rock-rose is a tiny shrubby plant found on chalk downs. The leaves are narrow, and in opposite pairs. The five yellow petals are comparatively big, with a large number of orange-yellow stamens. Red, brown and yellow rock-roses are delightful plants for a sunny rockery.

Citadel, a strong municipal fortress, used both to quell local disorders and to serve as a place of refuge for the citizens if attacked. Citadels were built by the Egyptians and Greeks,

and gradually developed into municipal centres such as the Acropolis at Athens and the Capitol at Rome. Fortified citadels were built all over the Roman Empire. They became common again in Europe in the 16th and 17th cents.

Citation, in law a summons to appear applied particularly to process in the Consistorial Courts and formerly in the Court of Probate. The word also denotes the quoting of previous judgments and legal authorities in support of any proposition on a question of law submitted to the Court.

Cîteaux, French village in the Côte d'Or department famed for the abbey founded by Robert of Molesme in the 11th cent. the first house of the Cistercians. Pop 250.

Cithæron, a range of mountains in Attica famous in Greek mythology. Here Actæon was turned into a stag and Pentheus killed by the Bacchantes. It is associated with the worship of Dionysus and with the legend of Oedipus. Modern name Elatea.

Citric Acid, a solid organic acid found free in nature to a considerable extent in the juices of citrus fruit, such as oranges and lemons. The richest source of the acid is lemon juice which contains about 7 per cent. The acid is obtained on the addition of lime as the insoluble calcium salt and it can be recovered from the latter by the addition of sulphuric acid.

The acid is a white crystalline solid melting at 153 C. It is used commercially in the form of its salts the citrates, which are employed in the manufacture of cooling drinks and effervescing salts. It is also used in dyeing and calico printing. The citrates had considerable use in medicine where they are used as tonics. Two of the principal preparations are a mixed citrate of ammonia and iron and a mixed citrate of iron and quinine.

Citron, a tree related to the lemon bearing large yellowish fruits shaped like a lemon but with coarse, thick

furrowed skin which is preserved in sugar for confectionery and cakes. The tree is a native of India cultivated in Mediterranean countries and in California and Florida with ovate leaves with toothed margin and purple flowers. See also CITRUS.

Citrus, a genus of plants belonging to the family Rutaceæ and including the bergamot citron lemon lime and orange. They are native to India and warm regions of Asia but are now cultivated in many parts of the Old and New World.

Città Vecchia, Maltese town, near the W coast. It is said to have been visited by St Paul and was the Maltese capital until the late 18th cent.

Ciudad Real (THYŌŌDA DN RĀHL) Spanish province bounded N by Toledo and S by Jaén. The hills in the W slope down to high plains in the centre and E. The climate shows extremes of heat and cold and rainfall is uncertain. The growth of cereals (wheat and grapes) is hampered by the poor irrigation and barren soil. Sheep and goats are raised in large numbers and the mules of this province are famous. Small deposits of coal mercury and lead are found. Communications are poor. The largest towns are Ciudad Real the capital and largest agricultural market Valdepeñas and Puertollano. Area, 7600 sq m. Pop (1931) province 498 000 town 90 000.

Ciudad Rodrigo Spanish town in the Salamanca province on the R Agueda. The Duke of Wellington was made Duke of Ciudad Rodrigo for his capture of the town by assault Jan 18 1812 during the Napoleonic Wars. There are the remains of a Roman settlement near by and a 12th cent cathedral. Pop c 10 000.

Civet, or civetcat a flesh-eating mammal, representing a family the Viverridæ which contains several species inhabiting tropical Asia and Africa. The civet is celebrated for producing a scented substance secreted by glands in the inguinal region and commercially valuable as a basis for perfumes. The animal are kept in

cages, and the substance is periodically extracted with spoons from the pouch where it is stored

Civets are ground-living animals and feed on small mammals and birds. They are striped or spotted, and most are about the size of cats, but in comparison have long, narrow heads. See also CARNIVORA

Civic Guard, the national police-force of the Irish Free State, an unarmed body which replaced the Royal Irish Constabulary in 1922. A Civic Guard police force exists in cities of Spain, but the guards are armed, often with both rifle and revolver

Civil Aviation. The first recorded ascent into the air by man took place 150 years ago, the hero of the day being a Frenchman named Pilatre de Rosier, who went up in a captive fire balloon from a private garden in Paris to a height of 100 ft. From that day onwards for c 100 years, the history of flying is concerned with man's efforts to control his direction and the length of his stay in the air, without any thought of whether his balloon, airship, glider, or aeroplane was to be used for peace or war. Strictly speaking, "Civil Aviation" refers to flying for pleasure or profit, to the carriage of passengers, goods and mails by air, and a few facts in order of date may not be amiss by way of introduction to this subject. Pilatre also made the first free flight in a balloon in 1783, travelling a distance of 5 m and reaching a height of 3000 ft, on which voyage he was accompanied by the Marquis d'Arlandes. In the following year, James Sadler made the first flight in England, ascending from Oxford in a hot-air balloon and travelling 6 m in half an hour. It is interesting to note that the Channel was first crossed in 1785, the ascent being made from the grounds of Dover Castle and the landing in a forest in Artois, the two brave aeronauts, as they were called in those days, being a Frenchman named Blanchard and Dr Jeffries, a wealthy American. In 1797 the first recorded descent by parachute was made by Garnerin, who

seated himself in a basket and cut adrift from his balloon at a height of 3000 ft, an exploit which he repeated over London in 1802. Garnerin was also the first to fly at night, for in 1807 he remained in the air near Paris for 7½ hours, being paid large sums of money by the Paris newspapers of the day for his vivid description of dawn from the sky.

The year 1866 was a landmark in the history of aviation, for it saw the foundation of the Aeronautical Society, afterwards made a Royal Society, which is the oldest scientific body of its kind in the world. The 8th Duke of Argyll was the first President and the Duke of Sutherland of that time was a Vice-President. The first Aero Exhibition was organised by the Society and held at the Crystal Palace in 1868, at which the late King Edward, then Prince of Wales, inspected a strange collection of balloons, kites, airships, and also models of aeroplanes which had been designed to flap their way through the air. The principal difficulty encountered by early experimenters in the art of air navigation was the lack of a suitable motive force. The steam-engine had been invented, but was regarded as too dangerous on account of fire to be fitted to an airship. It is amusing to recall that a French airship, more than 100 ft in length, is said to have been "rowed" through the air in 1870 by a crew of 8 men, but two years later an electrically driven airship was kept aloft for 2½ hours.

The years 1891-1894 are significant, for they witnessed the early flights in gliders and kites by pioneers such as Lilienthal on the Continent, Hargrave in Australia, and Langley in the United States. The first named glided 80 ft in 1891, Hargrave covered more than 300 ft in a captive flapping-wing machine, and was lifted into the air for long periods during his kite-flying experiments. Lilienthal was killed in 1896 after making more than 2000 successful glides, but during this period the progress towards controlled flight received further impetus by the

experiments of Langley who had constructed large-scale models driven by steam which performed over distances up to 1000 ft. The airship started life as a balloon but shaped like a cylinder with pointed ends and fitted with an elongated car beneath together with an engine and a propeller. In 1898 the names of Graf von Zeppelin and a wealthy young Brazilian, Santos Dumont became world famous for their experiments with power-driven airships. The first successful Zeppelin flight under control occurred in 1900 and in the following years Santos Dumont won 100 000 francs for a flight from St. Cloud round the Eiffel Tower and back again. Gliding flights in the United States by the brothers Wright were to result in a real turning point in the history of flying for in Dec. 1903 Orville Wright flew in a power-driven machine for 12 seconds and later for nearly 1 minute covering a distance of 850 ft against a 20 m an hour wind. The airliners of to-day carrying 40 passengers in luxurious cabins at speeds up to 150 m an hour have been developed from the earliest power-driven glider of the Wright brothers which flew in America 30 years ago. Civil Aviation as we know it to-day is therefore no more than 30 years old. Such progress has been made in so short a time that no man dare prophesy the future with accuracy but we do know that flying has come to be part of our daily life and in time it must be the normal method of mechanical transport for the reasons that it is the fastest means of travel and it enables one to move from place to place in a straight line which as the schoolmaster proves is the shortest distance between any two points.

To continue our history very briefly the Channel was crossed by Blériot for the first time in 1909 another French man named Conneau made a thousand mile circuit of Great Britain in 2^h hours in 1911. Raynham later on an active pilot in India created the first British duration record in the following year staying in the air at Brooklands

for 7½ hours and in 1913 an R.F.C. pilot named Longcroft who has since had a distinguished career in the Royal Air Force flew 630 m between Farnborough and Montrose in Scotland without a stop carrying a passenger. Immediately prior to the war with Germany aviation had reached the stage of becoming a business. In addition to spectacular flights for which prizes were offered by Governments and wealthy patrons of sport people were paying to learn the new art and others to fly as passengers for the thrill of being in the air. The earliest recorded airmail service in this country was that in 1911 when the pilots of the Graham White School carried more than 100 000 letters and cards between London and Windsor. In the same year a pilot named Paprier flew from Hendon to Paris non-stop in 4 hours an achievement at that time ranking with a flight from London to New York in the present day. In 1912 Vedrine flying in America attained a speed of 105 m an hour and Geoffrey de Havilland creator of the modern light plane the Moth reached a height of more than 10 000 ft carrying a passenger. The same year saw the first of the famous Short seaplanes and the Sopwith Works produced the first high speed scout the predecessor of the Hawker Furies in use by the R.A.F. at the present day. There is no authentic record of the first woman to fly but we do know that Miss Harriet Quimby flew the Channel in 1911. Pegoud looped the loop in 1913 and thus started the movement for accurate controls that should be responsive to the pilot's will enabling him to perform any evolution and recover level flight whenever it was desired. The Avro training machine which has stood the test of time with modifications of course up to the present day was brought out in 1914 and Farnborough the factory of the Royal Flying Corps turned out the first aeroplane which was really stable in the same year.

During the period Aug 1914-Nov

1918, civil aviation for all practical purposes ceased to exist. It had arrived at the stage where the carriage of passengers, goods, and mails over limited distances was possible, but no real attempt to establish regular services had been made. By 1918, air speed had increased to nearly 200 m an hour, long-distance flights without a stop were in the region of 1000 m and altitude was sufficient to clear the highest point of the world. None of these achievements in themselves was sufficient to warrant the institution of public air transport, and years were to elapse before the aeroplane became recognised as a normal vehicle for getting about the world. Every country realised the value of aeroplanes for speedy transport, and subsequent history proves that there is no royal road to success in the final method of locomotion, for none of the leading world-states has achieved complete superiority over all the others in the matter of civil aviation. In 1919, we started our first regular air service to the Continent and, in the same year, France and the United States also began to run air lines for the use of the public, which brings us to a point where we realise that aviation has greater potentialities for peace than any other science of modern times. Flying enables people to get together and talk things over. The aeroplane knows no frontiers, for there are no barriers in the sky, and therefore Customs restrictions, difficulties of language and coinage tend to disappear. Never previously had it been possible for people to travel with such freedom and at such speed, without fuss or worry, without dust or fatigue. Unfortunately, the regulation of civil flying as an international affair started with a bad handicap; its rules were drawn up by people obsessed with the idea of war and it still suffers from the fear of nations that the flying machine will be used again as a weapon of destruction. That this is possible no one can deny, but the advantages to the community of developing aviation

for the purposes of trade and travel are so great, especially to this country and to the Empire, that we can afford to ignore the dangers in our efforts to perfect the aeroplane for purposes of peace.

The British record in civil aviation is one of which to be proud, for our machines are considered safer than any others, our export trade in aircraft has been greater than that of any other country, the centre of the world's insurance for aircraft and flying risks is London and the confidence of foreign countries in our machines and methods is evidenced by the number of strangers who come to England to learn to fly. Imperial Airways, the national air transport company, was formed as a result of a merger of interests, in 1924. The first service to Paris was operated from Hounslow, at that time the Airport of London, on Aug 25, 1919, the fare being 20 guineas. Converted war machines were used on this route, and also on those to Brussels and Amsterdam started soon afterwards. The pioneers were the Aircraft Manufacturing Company, headed by the late Mr Holt Thomas and having as chief designer Captain de Havilland, the Handley Page Company flying their converted twin-engined bombers; and the Instone group of business men who supported air transport because they believed it would pay. Early in 1921, foreign companies with large State subsidies caused a cessation of the British lines, which could not compete with fares that were below cost. The British Government fell into line and paid subsidies to our own operators, but no satisfactory scheme was evolved until Imperial Airways came into being. To-day, every country in Europe is served by air lines, the principle foreign concerns being Deutsche Lufthansa, which covers Germany with a network of daily services extending W to London, S to Rome and Barcelona, and E to Russia, the Royal Dutch Air Lines which work to London, Paris,

and the E. Indies the S.A.B.F.A. of Belgium and its subsidiaries in the Congo the Air Union Air Orient Aeropostale and C.I.D.N.A. of France now merged under one management which operate throughout a large part of Europe to Syria Indo-China and to S. America. In the United States where the most intense development of flying has taken place the whole of that vast country is linked up by air services which work by day and by night in addition to which there are services through the W. Indies and down each coast of S. America linked again across the Argentine and over the mighty Andes range from Buenos Aires to Valparaiso. American companies now fly more than 80 million m. in a year and carry nearly 30,000 people.

Whereas in the United States air travel is an obvious convenience owing to the immense distances to be covered from one city to another it is a vital matter for the British Empire to be linked by the fastest means of communication because our people are so widely scattered and separated from one another by territory over which we have no control. Imperial Airways as its name implies was intended to bridge the gaps between England and the Dominions overseas and we can be justly proud of its achievements during the 10 years since its operations really began. To-day there is a weekly service in each direction from London to Egypt Iraq India Burma recently continued to Singapore and Australia another right through Africa from Cairo to Cape Town over 5000 m. of country which had no regular travel facilities except by boat round the coast and then inland at a few points by rail but mostly by bush track. The link with Canada is the next to be forged and this will come just as soon as money is available for wireless stations and big commercial flying boats capable of covering 1000 m. and more without alighting. Such boats have already been built

and flown, but the success of air transport and particularly its safety depend on careful ground organisation in advance of any public service and therefore we must wait a year or so before booking our seat by air to Canada. In 1931 Imperial Airways carried 40,000 people by air across the Channel some of whom were going merely to Paris for the week-end but many were engaged on long journeys to the farthest corners of the world. India and Kenya have been brought within 6 days of London and Cape Town is but 10 days distant and this gives the clue to the modern method of estimating distance in time and not in miles. What does it matter if Bagdad is 3300 m. away when you can reach it at lunch time on Wednesday by leaving London at midday on Saturday? In spite of the financial depression at the time large increases in traffic were recorded by most air lines during 1932 and Imperial Airways had a large share of this prosperity. During the peak month of August for instance more than 10,000 passengers flew on British commercial routes and over 100,000 people made flights in Great Britain mostly on joy rides to see what the earth looked like from above. Trade by air has reached considerable proportions for more than £1 million in value of goods have been exported from England in a year and the total of exports and imports has been up to nearly £3 millions. These figures exclude bullion of course for in 1932 more than £5 millions was transported by air over the Channel this being by far the easiest and cheapest way to handle it. Letters carried by the Imperial air mail services numbered more than 8 million for the last recorded year and the Christmas mail to India alone was over 1 ton. Statistics gathered from all parts of the world show that 700,000 m. of regular airways are in operation and machines engaged are flying 100 million miles a year. Such figures demonstrate beyond all doubt that civil aviation is a tremendous ab-

ever-growing force in the life of the world, for it has reached its present position in little more than a decade, in view of the fact that it did not really start until after the War

In England, the Air Ministry is the supreme authority on air matters, and in most countries aviation is controlled by political considerations and the needs of defence. As civil aviation becomes of more value and greater in importance than military aviation, so will the influence of flying for peaceful trade and travel increase, until the restrictions on the movement of aeroplanes across the world have been eliminated

For the organisation and control of flying, we have an Air Ministry which issues licences to pilots, aircraft, and aerodromes, according to their grade, the Royal Aero Club, which is the controlling body for sporting aviation, the Royal Aeronautical Society, the senior scientific institution of its kind in the world, and an aircraft industry which is second to none, having produced again and again the safest as well as the fastest machines to fly. British record flights of the last few years have been so numerous as to defy the memory, but bound up with the achievements of the individual are those of the machines and engines, the accessories and the fuels which have made them possible. Scott's flight from Australia in under 9 days, Mrs Mollison's to the Cape in just over 4 days, Mollison's crossing of the Atlantic in 30 hours, the flight of husband and wife to America, the late Bert Hinkler's crossing of the S Atlantic, all have been made with aircraft and engines produced by the same firm. In a different category are the high-speed, altitude, and duration records, for these need engines of tremendous power and aeroplanes which are the last word in efficiency. Britain won the Schneider Trophy outright with a speed of 388 m an hour, and the world's record in 1931 of 408 m an hour with

the same Vickers Supermarine seaplane and its 2600 horse-power Rolls-Royce engine. Since 1931, the Italians have wrested from us the supreme speed record, and the French hold the distance record previously won for Britain by the R A F pilots Gayford and Nicholletts in their Fairey Napier monoplane. And so it goes on, with one country always a little ahead of another in some particular branch of flying.

In the matter of safety, always a subject on the public mind when reference is made to aviation, it is a fact that British standards are higher than those ruling anywhere else and British aircraft, like British ships, enjoy a lower average insurance rate than non-British. Accidents are common to all forms of transport, people still fall off bicycles going at 8 m an hour and break their necks, so why should flying be regarded as dangerous when the same thing happens? Records show that flying has become a normal pursuit and the aeroplane an ordinary vehicle subject to no more risk when moving from place to place than a motor car, a train or a ship. The proof of this statement is to be found in the assessment of the risks by insurance companies. Those who take up normal flying as a career will find that the premiums are no higher than if they were engaged in any job other than a sedentary one or perhaps on a farm, whilst travellers on the Imperial air routes for instance can insure their lives with the usual benefits for 1s per £1000, which is exactly the same rate as for boat and train travel. For goods and mails, the insurance rates by air are already lower in most cases than for the corresponding journey over land or sea. Safety in the air will be increased still further by means of inventions that are being perfected at the present day, and it would not be beyond the bounds of possibility for air travel to reach the position of the Safety Service. New fuels have proved themselves to be

non-inflammable wireless direction finding is making it impossible for a pilot to get lost and soon it will lead him into port and perform his landing automatically. Robot controls relieve the pilot and crew of much physical strain and anxiety in the air keeping the machine on its course and in level flight the latest wing surfaces enable machines to land more slowly and a type of plane called the autogiro is able to hover bringing within sight the day when a large back garden will be big enough for an aerodrome who knows or who dare prophesy that this will not come to pass in the future?

Aeroplanes whether designed for operation from the land or water need harbours where they can be housed and maintained where passengers goods and mails can be received and dispatched. Airports are the harbours for aircraft and to an increasing extent they are becoming State or Municipal enterprises. In England the International airport for London is Croydon where the airlines of half a dozen countries may be seen at any time of the day or night. Croydon represents the expenditure of more than £500,000 of public money an investment which will prove increasingly valuable as time goes on. There is a State-owned airport at Lympne near Folkestone and municipal airports at Portsmouth Plymouth Manchester Liverpool and Hull to mention a few of the cities that have had the foresight to purchase land whilst it was cheap and obtainable in a convenient position for their local trade. Of the airports privately owned Heston which is the private pilot's harbour for London is an outstanding example of what should be done to cater for the future of Civil Aviation. Here there is a Customs House for direct clearances to and from the Continent hangars for overhauls lock ups for private planes a flying school shops where all accessories and equipment can be bought a floodlight for night landings a res-

taurant bar and a small hotel. Air taxis are available at most airports at home and abroad the price varying from 6d a mile for the small two-seater to some shillings per mile for a big cabin plane carrying several passengers and luggage on a journey say to China.

To learn the art of flying all you have to do is join a Club of which there are more than 50 in the country or a school at the nearest airport the difference being that at a Club you pay a subscription and take your turn with the rest of the members but at a school where it costs you more money to learn it is possible to obtain a licence in a week. The cost of learning to fly varies with the skill of the individual and may be as low as £70 or as much as £60. Gliding Clubs offer still cheaper air experience for those who are content to regard flying as soaring through the air as long as the wind is favourable and a modification to the glider so that it can take a small engine may solve the problem of teaching people to fly for £3. At the other extreme we have in England an International flying school at Hamble where pupils are trained from almost every country in the world not only to fly but to pass the necessary examinations for navigation wireless engineering in fact for every subject which it is necessary to study when making aviation a career. The Hamble School is an air university the only one of its kind where boys can continue their training in general subjects whilst learning to fly and to become aeronautical engineers. When flying as we understand it began the brothers Wright were the instructors almost immediately France became the world's school where everyone went to learn the new art to-day England possesses the finest instructors and machines. Our flying clubs have a membership exceeding 6000 and this total will continue to grow in proportion to the speed at which new aerodromes are established. If we

are to retain our position as the leading nation of the world, it is just as essential that we become a nation of airmen as we were a seafaring nation in days gone by. The trade and transport of the world in the future will be carried out by air, and it is vital to our interests that we build up an air transport system which can not only link us with the Overseas Dominions, but enable us to carry a large proportion of foreign passengers, goods, and mails.

The most controversial subject amongst flying people, one which crops up at irregular intervals, is that of the future of lighter-than-air aircraft, or to put it into simple terms, the future of airships. Great Britain, Germany, France, the United States, and Italy are the countries which have devoted money and time to the study of airship problems, but of these five, only Germany and the U.S.A. remain as supporters of the "Gasbag," the former alone putting her faith in this type of craft for commercial operation. To watch Dr Eckener manoeuvre the Graf Zeppelin into Hanworth Aerodrome is to be convinced that airships have their uses, but when one remembers the disasters that have occurred, particularly to our own *R101*, in which we lost a Secretary of State, Lord Thomson, a Director of Civil Aviation, Sir Sefton Brancker, who did not believe in airships, but was travelling in the craft because it was his duty, and many irreplaceable technical experts, it is a moot point as to whether the expenditure of money on a vast scale and the risk of human life are worth while. Personally, I believe that the real trouble with airship development lies in the fact that there has been insufficient experiment by trial and error. In the case of aeroplanes, hundreds of different types have been designed and built, scores of which have been utterly useless. Many of these new experiments have crashed, with disastrous results. In the case of the airship, the enormous cost of construction of these huge craft prohibits

the construction of numerous and varied types, and I feel that if there had been one-quarter as many experimental airships designed and built as there have been experimental aircraft, airships would be operating successfully all over the world to-day. Up to the present, only about half a dozen commercial airships have been built, and it is a well-known fact that designers learn so much during the design and construction period, that any airship is obsolete before it is even completed because of the rapid discoveries by the designers.

The most difficult part of an introduction to such a subject as "Civil Aviation," at once an art, a science, and a business, that has reached the most interesting stage of its development, is any form of reasonable prophecy as to the future. Already we know that flying has taken the place of all other forms of transport for the purpose of carrying gold across the Channel, doctors and nurses across Australia, mining prospectors and equipment into the Canadian Arctic Circle, but in these cases aeroplane transport is the only practicable method. How does it stand in relation to trams, ships, motor-cars, and lorries which operate over the rest of the world? The aeroplane, using the word in its general sense to cover all heavier-than-air machines, will become the only vehicle for the transport of passengers, letter mails, and urgent freight over distances exceeding 100 m. To attain this position of importance in the life of the community, the aeroplane must prove its value by gradual stages during the next 10 to 20 years. The roads of this and every other country which is highly developed are overcrowded. People set out in cars on journeys of hundreds of miles that could be undertaken in a quarter of the time by air. The railways carry mails and passengers who could well afford to pay for the superior speed of the airway. Travellers still go to India and Africa by sea when their quickest and cheapest route is by air.

It has been stated many times that transport is civilisation. In order that the peoples of the world may enjoy a reasonable standard of comfort it is essential that there is good communication with countries outside the position of air transport in the home of the future is destined to be of paramount importance. Air routes will be used for all long-distance mails because the aeroplane is the fastest method of transport. Similarly they will be patronised by travellers for the reason that they provide the greatest comfort and speed. Urgent freight will be sent by air because insurance rates are lowest and the buyer wants the goods in the shortest possible time. What then you may ask will be the function of trains, ships, lorries and motor cars? With the exception of the last named the others will carry cargo, passengers who cannot afford air transport or others to whom time is no object. Motor-cars will be used for short journeys and as an alternative to aeroplanes over land where time again is of no particular value. All of which leads us to the conclusion that air transport has become the most important factor in the revival of prosperity for this country and the greatest medium for peace at the world has ever known. For by this means people can get together and do things over in a manner that was never possible before the flying machine had been invented.

ALAN J. COBHAM

Civil Law originally the law governing the city and the citizens of Rome, distinct from the law applied to the provinces forming part of the Roman Empire. It is now used as the name for that part of the law of a State not included in criminal law (q.v.).

Civil List. Until 1715 the ordinary revenues of the Crown by immemorial custom consisted of various dues and feudal dues, profits from Crown lands, rights to royal fish (whales and porpoises), wreck, treasure-trove, estates and forfeitures etc. collected by royal prerogative. By the Civil

List Act passed since 1715 at the beginning of each reign these hereditary revenues are paid into the consolidated Fund and in consideration of assigning them the Royal Family are endowed by the Acts with a regular annual charge upon the Consolidated Fund called the Civil List. The annual amounts paid to the Royal Family are as follows: Their Majesties Privy Purse £110,000; salaries of Household £15,500; expenses of Household £193,000; works £90,000; Royal Bounty £13,000; unappropriated £8000; a total of £470,000. In addition annuities amounting to £106,000 are paid to various members of the Royal Family. During the financial crisis which threatened in 1931 the King voluntarily agreed to a reduction of £50,000 from these figures as a temporary measure of economy.

Civil Service all officers of the Crown engaged in the administrative services of the State. The service is divided into various departments e.g. the Home Office, Board of Inland Revenue, Board of Trade, Foreign Office etc. The Civil Service offers permanent employment and a retiring pension. Formerly appointments were made by the executive Government but in 1870 competitive examinations were introduced for all posts except a few requiring special qualifications which are filled by nomination. Every candidate must pass a medical examination. There are 4 grades of employment: (1) Administrative (2) executive (3) clerical (4) writing assistants, all filled by competitive examinations and in the case of the first two grades by special selection from the candidates who pass. Starting salaries vary from £18s a week in class 4 to £400 a year in the higher administrative branches with additional appropriate bonuses. Strict age-limits are laid down for entry into each branch.

Since the Sex Disqualification Act 1919 as reinforced by a special resolution accepted by the Government, single women and men have been on

elephone The town is similar to be Papworth Settlement (q.v.) near Cambridge

Clairvoyance *See* PSYCHICAL RESEARCH

Clam, a marine Lamellibranch mollusc (q.v.) akin to the cockles The giant clam is the largest bivalve the shell being sometimes a yard long and weighing over 300 lb It has a ribbed outer surface and deeply scalloped edges Clams are found in the Indian and Pacific Oceans *See also* MOLLUSCA

Clan, a social group in reality an extension of the family found in primitive communities The clan is confined to those who trace descent through the mother or in other cases through the father Marriage within the clan is forbidden Members of the clan regard themselves as kinsfolk and the whole strength of the group may be mobilised to support the claims of any individual within it The so-called scots clans are not technically entitled to the name since they allow marriage within the group

Clan na-Gael Irish American secret society with headquarters in Chicago which took a prominent part in the Home Rule Agitation of the eighties of the 19th century

Claparède, Jean Louis René Antoine Edouard (1832-1870) Swiss naturalist Professor of Anatomy at Geneva known for his researches on echinoderms infusoria and rhizopods

Clare county on W coast of Irish Free State bounded N by Galway W by the Atlantic S by Limerick and E by Lough Derg and the Shannon Clare has hills in the E and W including the Slieve Bernagh Slieve Auchty Callan and Elva separated by a broad lake strewn valley the SW has an extensive plain There are many short rivers including the Cooraclare Inagh Arrowkell and Bunnatty The coast is broken and rocky with only one good harbour Liscaunor Bay Agriculture employs most people but there is a far greater area under grass than

is cultivated Sheep pigs hens and cattle are raised Crops include potatoes and oats A considerable part of the county is bogland Slate is quarried and a fine quality black marble is found near Ennis There are good fisheries and eels are plentiful in the rivers Chief towns are Ennis the county town Clare and Lillaloe

There are numbers of ruined abbeys and castles all over the county and various ancient towers and encampments Area 130 sq m pop 95 000

Clare, John (1793-1864) the Northamptonshire Ploughboy Poet after a boyhood and youth spent in farmwork a gipsy camp etc began to write poems in 1818 his first volume being issued in 1820 After publishing several volumes of verses marked by a keen delight in natural beauty he became insane and died in the Northants County Asylum His work was largely forgotten until in 1900 Edmund Blunden issued a new edition of his poems

Clare John Fitzgibbon Earl of (1749-1802) Lord Chancellor of Ireland opposed Grattan's movement for parliamentary reform in Ireland and Catholic toleration Appointed Attorney General 1783 and Lord Chancellor 1789 Created Earl of Clare 1793

Clare, St. (1194-153) the first woman follower of St. Francis of Assisi (q.v.) she founded the Order of Poor Clares who follow the Franciscan rule and are one of the severest female religious orders Day Aug 1-

Clarence Dukes of a title first held by Lionel third son of Edward III created Duke 1300 Other royal holders of the title were Thomas (1388-1411) second son of Henry IV George (1449-78) brother of Edward IV executed for treason William IV (1765-1837) prior to his accession and Albert Victor (1864-189) eldest son of King Edward VII

Clarendon, Edward Hyde 1st (1609-1674) English statesman-historian entered the

ment, 1640. He supported the King's authority, but opposed violence, and assisted in the impeachment of Strafford, 1641, in 1642 he became the King's adviser, with Colepeper and Falkland. His influence was overshadowed by the military Royalists during the Civil War. He went into exile with Charles II, and aided in his Restoration, being created earl in 1661, after his daughter Anne had married James, Duke of York. As Lord Chancellor (from 1658) Clarendon opposed religious indulgence and sided with Parliament in passing the Act of Uniformity. Failures in foreign policy and the Dutch War of 1667 led to his dismissal, impeachment and exile, and he died in France. During his exile he wrote his famous *History of the Rebellion*, published posthumously (1702-4).

His son, Henry, 2nd Earl (1638-1709), was a supporter of James II, and was twice imprisoned for intrigue against William III.

Clarendon, George William Villiers, 4th Earl of (1800-1870), English statesman and diplomatist. Minister at court of Spain, 1833, Lord Privy Seal, 1839-41, President of Board of Trade, 1846. As Lord-Lieutenant of Ireland, 1847-52, Clarendon succeeded in restoring order after a period of famine and rebellion. Appointed Foreign Minister, 1853, he maintained the Allied campaign with France during the Crimean War, and represented Britain at the Peace of Paris, 1856. Returned to the Foreign Office in 1865 and 1868, dying during his tenure of office.

Clarendon, Constitutions of, a code of English laws propounded by Henry II and enacted by a great Council at Clarendon, nr Salisbury, in 1164. Its main provisions were that clergy accused of crimes were to be tried in the King's courts, that no prelate was to leave the realm without the King's permission, that prelates were to be subject to feudal burdens. The *Assize of Clarendon*, 1166, laid down the principles on which the administra-

tion of justice was to be carried out. It is in these Constitutions, which were hotly resisted by the clergy, that the jury of "twelve lawful men" is first mentioned.

Clares, Poor, an order of nuns founded by St Clare 1194-1253, under the influence of St Francis of Assisi. The rule is one of the strictest of those for religious women.

Claret, *see* WINE.

Clarifying, the process of removing fine suspended solid particles from liquids. It is usually accomplished by the addition of albuminous or gelatinous materials, such as egg albumin, casein, isinglass, which form flocks in the liquid around the fine particles and easily settle or can be filtered off. The use of heat, especially when albumin is used, is advantageous. Tannin precipitates many gums and pectins. Finely-divided solid substances, such as paper pulp and fuller's earth, are frequently employed, especially in connection with liquors containing resinous or waxy substances. Wine essences, and liquors may be clarified in this way, as well as by the use of powdered egg albumin, starch, and talcum powder. *See also* CENTRIFUGES.

Clarke, Rt. Hon. Sir Edward George (1841-1931), English barrister and politician. Called to the bar, 1866; he appeared in various famous trials, including the Jameson Raid case, 1896. Elected Conservative M.P. for Southwark, 1880, he became Solicitor-General, 1886-92. He resigned in dispute over S. African policy, 1896, but was re-elected, 1906, resigning shortly afterwards. Author of *Law of Extradition* (1866), *Story of My Life* (1918), and *Benjamin Disraeli* (1926).

Clarkia, a group of very beautiful hardy annuals with graceful stems 1-2 ft high, bearing small leaves and a spike of many dainty flowers of many colours.

Clarkson, Thomas (1760-1846), English anti-slavery advocate. The publication of his prize-winning Latin essay on slavery, 1786, led to his

ganisation of a campaign for the abolition of slavery in Africa. Published many pamphlets delivered addresses in England and France during the sympathy of Pitt Fox and Burke. Clarkson's *History of the Abolition of the Slave Trade* appeared in 1808 and in 1833 he assisted in founding the Anti Slavery Society for the suppression of slavery in the W. Indies.

Classical Literature The Classics is a term universally understood to refer to the literature of ancient Greece and Rome and it is not only convenient but logical to consider these two together. For although the Latin language was quite distinct from and in no sense derived from the Greek language Latin literature was to a very large extent derived from Greek literature. Ancient Greek literature covers the period from c. 1000 B.C. to the beginning of the 6th cent. A.D. and is usually divided into three periods: the *Classical* up to 479 B.C. the *Alexandrine* 323 B.C. - 30 B.C. and the *Post Alexandrine* 30-577.

The first two names are Homer and Hesiod. Homer is representative of early Greek epic poetry as known to us in the *Iliad* and the *Odyssey*. The unique glory of these epics is that unlike those of other literatures they have a mature perfection of diction and thought an absence of crudity coupled with a still retained freshness of youth. Hesiod is accredited with the authorship of didactic and philosophic poems (written like the epics in hexameters) two of which the *Theogony* and the *Works and Days* have survived.

The next poetic forms to be developed were the Iambic and the Elegiac both of which sprang from Ionia. The former of these was readily adapted to mockery and lampoon and it is as lampooners that its chief masters Archilochus of Paros (c. 650 B.C.) Semonides of Amorgos (c. 650 B.C.) and Hipponax of Ephesus (c. 530 B.C.) are best

known. The Elegiac (alternate hexameters and pentameters) became a very popular form and was later the commonest medium for the epigram (q.v.).

From the Aeolians came the true beginnings of the Greek lyric and each of two great poets of whose work only the scantiest fragments have survived has given a name to two famous forms of classical verse. These were Alcæus and Sappho (q.v.). The choral or dithyrambic ode was developed by the Dorians and mainly by Alcæon. Famous poets in this form some of whose work is lost were Stesichorus Arion Corinna and Simonides of Ceos but the greatest of them all was Pindar (q.v.).

In the 5th cent. B.C. came the great age of Attic drama. For all practical purposes this is represented for us by the tragedies of Aeschylus Sophocles and Euripides and the comedies of Aristophanes (q.v.). Tragedy was evolved from the choral odes in honour of the god Dionysus and this fact of its origin was preserved in the traditional manner used by the great tragedians in writing their plays in sets of four. A trilogy of three tragedies closely related to each other was followed by a satyr play (of which the only extant example is the *Cyclops* of Euripides) in which the chorus was composed of satyrs the attendants upon Dionysus. Comedy was similarly developed from the lewd phallic songs in honour of Dionysus and it appears to have had a more continuous life than tragedy the last great comic dramatist of Greece being Menander (c. 335-293 B.C.) who lived in but did not belong to, the Alexandrine period. The prose of the classical period begins with the historical writings of Herodotus (q.v.) and was continued by those of the Athenians Thucydides and Xenophon (q.v.). The art of oratory also reached its highest in Athens and is associated chiefly with the names of Isocrates Demosthenes Aeschines (q.v.). A third branch

prose literature is represented by the philosophical writings of Plato and Aristotle (*qqv*)

The poetry of the Alexandrine period differs from that of the classical period in being derivative and largely artificial. In the 3rd cent the great elegiac poet was Callimachus and the great epic poet was Apollonius Rhodius (*qv*). The drama is said to have had a flourishing life, but no examples have survived. But the greatest achievements of Alexandrine poetry were the idyllic poems of Theocritus (*qv*), Bion, and Moschus. That this was a learned period is evidenced in its prose literature, which delved deeply into the problems of mathematics, astronomy, and literary criticism. Of more general literature reference must be made to the *Histories* of Polybius, the *Geography* of Strabo, and the *Lives* of Plutarch (*qv*). The great literary critic of this period was Dionysius of Halicarnassus.

The Post-Alexandrine period is of far less importance, and all that is of value in its poetry is preserved in the Greek Anthology and the Anacreontic poems. In prose the very significant work of Lucian (*qv*) belongs to the beginning of this period, as does also the *History* of Josephus (*qv*). Other memorable historical and geographical works were written by Eusebius, Diogenes Laertius, and Pausanias.

The unique distinction of classical Greek literature is that it was an entirely native product, owing next to nothing to foreign influences. Its influence, direct and indirect, upon the whole of European literature is almost too great to be assessed.

This influence manifested itself most immediately in the literature of ancient Rome. There were certain beginnings of a Roman literature independent of the Greek influence, and some fragments of poems in Saturnian metre (*qv*) and of Fescennine Verses (*qv*) remain. It is probable that from these beginnings there was a continuous and vigorous output of native Roman

literature, but it has not survived, and the literature that must be considered was based almost entirely on Greek models. This may be divided chronologically into that of the Republic (250-27 B.C.), that of the Augustan age (27 B.C.-A.D. 14), and that of the Imperial age (14-524).

The earliest Latin poets of any fame were Livius Andronicus, Naevius, and Ennius, the last of whom is the most important owing to his use of hexameters (*qv*). To the republican period belong also the two greatest Roman comic dramatists, Plautus and Terence (*qqv*), whose plays were mainly translations from the Greek, and two of the greatest of all Latin poets, Lucretius (*qv*) and Catullus (*qv*). Satire (*qv*), which became the most original product of Roman literature, was represented in this period by the work of Lucilius. The earliest prose was that of Cato the Censor (*qv*) and the *Res Rusticae* of Varro (*qv*), but the greatest prose writers of this period were Cicero, Julius Caesar, and Sallust (*qqv*).

Into the brief Augustan age were crowded the work of many of the greatest Roman writers. In poetry the work of one famous writer, Gallus, unhappily lost, but there is ample compensation for this. The *Eclaves* and *Georgics* of Vergil (*qv*) contain much of his finest poetry, but no one can quarrel with the fame attached to his *Aeneid*, the great epic poem of Rome. The other great Augustan poets were Horace (*qv*), who clothed his shrewd and sophisticated observations in gracefully executed lyric, Tibullus and Propertius (*qqv*), elegiac poets, the first of whom dealt most delicately, and the second most robustly, with the theme of love, and Ovid (*qv*), who wrote much correct and dull verse in hexameters and elegiacs, and whose literary reputation has suffered from a puritanical ignorance of his best work, which was, after all, no more licentious than that of many poets who for some reason have not been so stigmatised as "shocking".

The outstanding prose work of this period is the *History of Livy* (q.v.)

The early literature of Imperial Rome may be conveniently considered as a subdivision, which has been called the Silver Age (A.D. 17-130). This period produced the greatest Latin tragedian Seneca (q.v.) whose influence was particularly felt in the French drama. An epic poet of great achievement and still greater promise was Lucan (q.v.). Martial (q.v.) remains the prince of epigrammatists who allowed no principles of propriety or decency to stand as an obstacle to the play of his mordant wit. But it was Persius (q.v.) and later Juvenal (q.v.) who developed the Latin genius for satire which had already been apparent in the work of Lucilius and Horace. Other poets were Calpurnius Statius, Valerius Flaccus and Silvius Italicus.

The prose of the Silver Age comprises the *Natural History* of Pliny the Elder, the *Letters* of Pliny the younger, the *Annals* of Tacitus (q.v.) eminently great work of history, *Satyricon* of Petronius (q.v.) and literary criticism of Quintilian.

Few of the later writers of the Imperial age have won so permanent place in literature as the foregoing authors but reference is due to the following: the poets Aulus Gellius, Silius Claudian and Clemens; prose of Apuleius, Justin, Marcus Tertullian and St. Augustine; Hippo and a considerable body of immorians and jurists.

CONSULT H. N. Fowler *History of Ancient Greek Literature*, *History of Latin Literature* (1903).

Claude Lorraine (1600-1682) French painter whose real name was Claude Jéac. Most of his life was spent in Rome where he gained considerable renown and obtained many patrons and customers. He has left a large number of fine landscapes in which the treatment of the skies and of light are particularly successful. Specimens hanging in almost every European collection of importance.

Claude kept a record of all his paintings in what he called his *Liber Inventus* volumes of tinted drawings the details of its sale being noted on the back of each. These serve as a valuable means of identifying his authentic works.

Claudel, Paul (b. 1864) French playwright and poet has held many diplomatic posts becoming in 1911 French Ambassador at Tokyo and in 1912 at Washington. His verse is largely religious and is generally *vers libres* in form. Examples are *Le Calvaire* (1914) and *Femmes des Saints* (1915). Of his plays which are better known than his poetry *L'annonce faite à Marie* (1912), *L'Œuvre* (1911), *Le Pain Noir* (1918) and *Le Père Humilié* (1919) may be mentioned.

Claudius Roman emperors

(1) TIBERIUS CLAUDIUS emperor 41-54 succeeded Caligula. Introduced internal reforms reorganised trade extended civic rights to communities outside Italy and built two great aqueducts. His infamous wife Messalina (q.v.) was succeeded by Agrippina who poisoned Claudius to secure the rights of her son Nero as emperor.

(2) MARCUS AURELIUS CLAUDIUS emperor 161-180. He overwhelmed the Goths in Moesia 169 winning the title Gothicus.

Claudius, famous Roman family

APPIUS SABINUS CLAUDIUS the founder was a Sabine who settled in Rome c. 600 B.C. and became Consul 493.

APPIUS CLAUDIUS CRASSUS consul 471 and 451 B.C. brought himself into conflict with the plebs and his attempt to seize a plebeian maiden, Virginia, from her father resulted in an insurrection and the imprisonment and death of Claudius.

APPIUS CLAUDIUS CECUS was censor 312-307 B.C. Consul 307 and 296. He admitted plebeians to the Senate and extended the franchise. He built the Appian aqueduct and began the construction of the Appian Way. He renewed his people's courage by spiritedly rejecting offers

of peace made by the Greek invader, Pyrrhus. The first recorded Roman author, Claudius compiled two legal works, and his speech against Pyrrhus is the origin of Latin prose composition.

APPIUS CLAUDIUS PULCHER, Consul 54 B.C., was an associate of Cicero, with whom he corresponded. Implicated on charges concerning his governorship of Cilicia, he was, with Cicero's help, acquitted. An ally of Pompey, Claudius fled from Caesar's advance, and died while commanding Pompey's forces in Greece.

Clausen, Sir George (b. 1852), English painter. His work is greatly influenced by the impressionist school, and he has painted a number of sunny and colourful landscapes, with figures of men and women working in farmyard surroundings and in the fields. He became an A.R.A. in 1895, and R.A. in 1908 and was for some time Professor of Painting at the Royal Academy. He published *Six Lectures on Painting* in 1904, and *Aims and Ideals in Art* in 1906. He was knighted in 1927, there are three of his works in the Tate Gallery, including *Girl at the Gate*, purchased by the Chantrey Bequest in 1890.

Clausewitz, Karl von (1780-1831), Prussian general and military writer, whose most famous work, *Vom Krieg* (1832), founded the strategy of modern warfare, and paved the way for the Prussian victories of 1866 and 1870.

Clavichord, a keyboard instrument in which the strings are vibrated by brass tangents, i.e., wedge-shaped pieces of metal. This obsolete instrument, which in outward appearance resembled a piano, but for its square or rectangular shape, was used by Bach and Mozart. See also **PIANOFORTE**.

Claw, the horny tip of the toe in vertebrate animals. It differs from nails and hoofs in being more or less compressed and sharp. The similar structures on the feet of insects, spiders, etc., are not true claws. The term is also used for the pincer-like nippers of crabs, scorpions, etc.

Clawed Frog, a frog-like amphibian,

belonging to a group distinguished by the absence of the tongue. Clawed frogs are found only in Africa, are purely aquatic, and have the hind feet fully webbed, but differ from other amphibians in having the three inner toes of the feet clawed. They also have along the sides of the body a row of delicate filaments, representing the lateral line of fishes.

Clay, Henry (1777-1852), American statesman and orator. He advocated the war with Britain in 1812, and represented the U.S.A. at the Peace of Ghent, 1814. As Secretary of State, 1825-9, he supported the S. American Republics in their struggles for independence. Clay pioneered the "American System" of protection for local manufactures, reducing his Tariff Bill below its original high level in 1833. He adopted a moderate attitude in the slavery dispute, and though distrusted by both sides, effected the "Missouri compromises" of 1820 and 1850.

Clay-bird Shooting, see **SHOOTING**.

Clay Iron-stone, see **IRON AND STEEL**.

Claymore (Gael, *claidheamh mòr* = great sword), a two-edged broadsword used by the mediæval Scottish Highlanders. The name was also applied to a 16th-cent. basket-hilted sword still carried by officers in Highland regiments of the British Army.

Clays are mineral substances varying greatly in composition, but having as their base the mineral *Kaolinite*, which is hydrous silicate of aluminium ($\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot 2\text{H}_2\text{O}$). In some cases, however, water does not enter into their composition. They are formed by the long-continued action of water and carbon dioxide upon feldspar ($\text{K, Na Al Si}_3\text{O}_8$, crystalline constituents of many igneous rocks, such as granite). The alkalis, sodium and potassium, are washed away, and the excess of silica is left mixed in the clay.

Clay is characterised by an extraordinary property called plasticity, which is not yet thoroughly understood. Not all clays are equally plastic, the kaolins or china clays are but slightly so, and are called "lean,

while what are called ball clays are highly plastic or fat. Clays are much more plastic when wet than when dry and are practically always impermeable to water. They are recognisable by the smell given off when moistened.

Clay is generally composed of a mass of fine particles which in a coarse clay are $\frac{1}{16}$ millimeter in diameter and in a fine clay $\frac{1}{64}$ millimeter. By definition they may be as large as $\frac{1}{32}$ millimetre. Clays range from pure kaolin to kaolin with 60 per cent of impurities which are generally iron oxide, sand and lime, but iron sulphide may occur in the form of pyrites or marcasite, organic matter in oil or carbonaceous shales and fossils in the form of shells.

By consolidation due to heat or pressure, clay may form a variety of deposits such as mudstones and shales. Mudstones are fine grained without bedding but shales ($q\epsilon$) usually possess a definite layered structure and are easily split in consequence. They have the same varied composition as clay being sandy, calcareous or containing iron impurities. Many are of economic importance such as oil shales which yield paraffin as an organic impurity and formerly the alum shales of Whitby were worked but alum is now chiefly obtained as a by product of coal mining. Shales when crushed can be used for all the purposes of ordinary clay.

Marls ($q\delta$) are calcareous clays formerly extensively used for increasing the fertility of soils by top dressing and by increase of the calcareous content may grade into clayey limestones.

Bauxite and laterite (qqv) are varieties of clay formed under special monsoon conditions and important as sources of aluminium.

In Great Britain there are five great deposits of clay each representing long periods of deposition in deep muddy areas: the Lias, the London Clay, the Oxford Clay, the Hammeridge Clay and the Gault Clay (qqv). Each of

these at one time or another formed shale deposits also. Marl is well seen in the Kenner Marls of the Midlands and mudstones occur in the Lake District. The Brick Earths of the Thames valley are a mixture of sand and clay in brick making proportion.

Clayton Bulwer Treaty between USA and Great Britain so called from the names of those who negotiated it (1850). John M. Clayton of USA Secretary of State and Sir H. Lytton Bulwer of Great Britain. By its terms neither power was to obtain exclusive control over any canal across the Central American Isthmus but all such communications by canal or railway were to be neutral. It was superseded (1901) by the Hay Pauncefote Treaty.

Clay with Flint, a stiff clay varying in colour from red to yellow and containing many flints together with other rounded stones. It is found in the S of England often overlying the chalk of which it is regarded as an insoluble residue though suggestions have been made that it was deposited by the ice sheet of the Glacial Period or that it represents the remains of beds younger than the chalk and now weathered away.

Cleaning. The cleaning of fabrics by methods gentler in their action than those used by the ordinary laundry may be divided into what is known as dry cleaning, wet-cleaning and the treatment of stains or spotting as it is technically termed.

Dry-cleaning a French invention consists in washing with a liquid other than water. Since nearly all textiles are fundamentally colloidal in character water is absorbed by the fibres causing them to swell as gelatine swells when placed in water. Hence after drying they are liable to be more or less changed for example to shrink and furthermore the coating of dye on their surface is liable to disturbance. Many organic substances such as benzene, petroleum ether, carbon tetrachloride and other substances having a powerful solvent action upon grease have no affinity whatever for the

textile fibre, and hence do not affect the most delicate fabrics when used to wash them. The dirt normally accumulated by garments and other textiles is greasy in character, or at least held by grease to the fabric, and hence is readily removed by these solvents. It is, however, possible to find soaps which will dissolve in dry-cleaning liquids, rendering them still more

Kind of Stain	From Linen	From Coloured Goods		From Silks
		Cotton	Woollen	
Sugar, glue, blood, and albumin	Simple sponging with water			Sponging with water
Grease	Same as silk	Same as silk	Same as silk	Benzine, ether, ammonia, potash, magnesia, chalk, yolk of egg, carbon tetrachloride
Varnish and oil paints	Turpentine, nr benzine, and soap, aniline oil			Benzine, ether, soap, rub carefully, aniline oil
Stearine	Very strong alcohol, 95 per cent			
Vegetable colours, red wine, fruit, red ink	Sulphur vapours, warm chlorine water, bleach	Sponge with warm soapsuds or ammonia water, methyl alcohol		The same as coloured goods, rub gently and carefully
Alizarine ink	Tartaric acid, the older the stain, the stronger the solution	Dilute tartaric acid if the stuff will bear it		The same, with
Iron rust and ink made of nutgalls	Warm oxalic acid solution, dilute hydrochloric acid, then tin shavings	Repeated sponging with a solution of citric acid, if the colours will bear it	The same, dilute hydrochloric or oxalic acid if the wool is dyed naturally	Spot with diluted mineral acids
Lime, lye, or alkalis	Dilute acids	Drop dilute acetic acid upon it		The stain moistened can be rubbed off with the finger
Tannin, green nut shells	Eau de Javelle, warm chlorine water, concentrated solution of tartaric acid	Alternate sponging with water, and with more or less dilute chlorine water, according to the colours		
Coal tar, wagon grease	Benzine, carbon tetrachloride, chloroform	Benzine, carbon tetrachloride, chloroform		Benzine, carbon chloride, chloroform
Acids	Red acid stains are destroyed by ammonia, followed by thorough sponging with water. Brown stains of nitric acid are permanent			



CONWAY WALES. THE CASTLE THROUGH SUSPENSION BRIDGE

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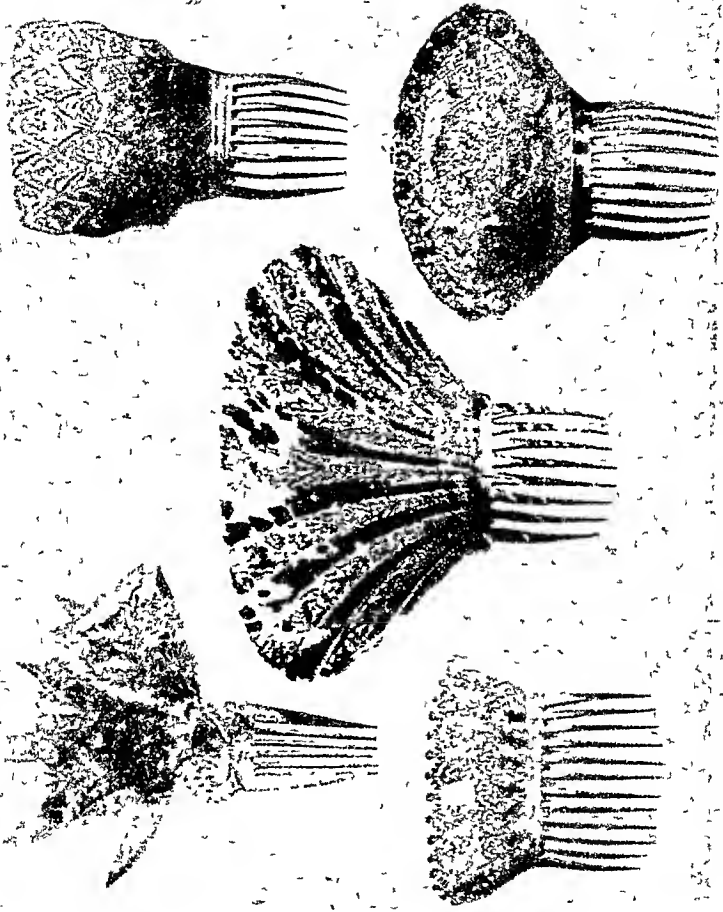
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Vegetable colours, red wine, fruit, red ink	Sulphur vapours warm chlorine water, bicarb	Sponge with warm soapsuds or ammonia water, methyl alcohol		The same as coloured goods, rub gently and carefully
Alizarine ink	Tartaric acid, the older the stain, the stronger the solution	Dilute tartaric acid if the stuff will bear it		The same, with care.
Iron rust and ink made of nutgalls	Warm oxalic acid solution, dilute hydrochloric acid, then tin shavings	Repeated sponging with a solution of citric acid, if the colours will bear it	The same, dilute hydrochloric or oxalic acid if the wool is dyed naturally	Spot with diluted mineral acids
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CONWAY WALES. THE CASTLE THROUGH SUSPENSION BRIDGE



19TH CENTURY COMBS OF ENGLISH, SPANISH, AMERICAN, CHINESE
AND GERMAN ORIGIN

effective. The commonest of these is similar to ordinary soap which is a mixture of the sodium salts of various fatty acids. It is called *antibenzine pyrin* and is a magnesium instead of a sodium soap. This and similar substances (benzine soaps) have the power of absorbing water to a considerable extent and thus avoiding the necessity for too careful drying of the goods to be cleaned. Another very important property they possess is that of preventing the generation of frictional electricity in the cleaning process by destroying the insulating powers of the hydrocarbon. Since the smallest spark is sufficient to ignite these substances the benzine soap is added not only to the cleansing liquid but also in very small quantities to that used for rinsing.

The usual type of washing machine is simply a closed drum containing a perforated cage. The goods are placed in the cage which is rotated. After treatment the excess of benzine is removed by means of a centrifuge and the goods are then rinsed in clean liquid.

The process of dry-cleaning is not suitable for all classes of fabric particularly cotton, linen and half silk as well as white linen and satin. Before cleaning the dirtiest parts of the goods are usually treated with concentrated benzine soap.

An important part of the cleaner's art consists in removing spots and stains which resist the simple process of dry-cleaning. This is done by the use of various agents and solvents which are applied by hand to the stain. The recognition of the nature of the stain and the choice of an appropriate substance for removing it is a matter of training and experience. This method is limited by the fact that the agents used to dissolve the stain must not attack the fabric. Woollen fabrics are particularly sensitive to alkalis which are necessary for removing many stains. Even when the fabric is not destroyed its appearance may be seriously injured. The art of

using all these agents can only be acquired by experience since none of them is suitable for removing every kind of stain. The accompanying table taken from the work mentioned at the end of this article summarises the methods used in the commonest cases.

Wet-cleaning is a process of careful and judicious washing with water and soap and soda. The water must be soft. If soft water is not available it must be softened either by a zeolite or by adding soda. Woollen fabrics are easy to clean by this method, soda soap and quillaia bark being the chief substances used.

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Clæarchus (5th cent. B.C.) Spartan general whose tyrannical rule of Byzantium resulted in his overthrow. He joined Cyrus' Persian army assisting him in the expedition of the ten thousand against his brother King Artaxerxes. On the death of Cyrus at the battle of Cunaxa 401 Clæarchus assumed command but was captured and executed by Artaxerxes.

Clearing House, Bankers. The meeting place where the various banks which are members of the clearing house send each day all the cheques that have been paid in to them drawn on another bank. At the clearing house the cheques drawn on each bank are cancelled against those it holds drawn on each other bank and the difference in the totals between each two banks is calculated. In London this difference is then adjusted by an entry carried out by means of special slips made out and sent to the Bank of England where the amounts credited to the account of each clearing bank are adjusted to cancel the differences arrived at in the clearing house.

There are ten London member banks of the London Bankers Clearing House. The banker in the country clears his cheques (a) through London if drawn on a banker outside his own town,

(b) through one of the provincial clearing houses if both parties are situated in a town having a clearing house, or (c) if situated in a town where there is no clearing house, he may clear local cheques by sending his cheque direct to each bank, settling the difference by cash, drafts, or by a payment through London

There are clearing houses in Birmingham, Bristol, Hull, Leeds, Leicester, Liverpool, Manchester, Newcastle, Nottingham, and Sheffield. See also BANKING AND CREDIT

Clear-wings, a family of moths, related to the clothes moth but distinguished by the absence of the scales from the wings. Many of them mimic hymenoptera, notably the hornet clear-wing, which closely resembles the large wasp, after which it is named

Cleat, a development of the belaying-pin, a simple iron pin with a shoulder in the middle passing through a piece of wood or iron and projecting on either side. It is used to make fast a rope or cord. The cleat consists of a pin with a centre support and generally a base plate for attachment. The "jamming cleat" has a smooth rounded junction between the pin and the support on one side, while on the other this junction is so tapered that when a rope is passed through it under tension it is jammed and firmly held

Cleavers, a plant belonging to the Rubiaceae, exceedingly common in hedges, and a tiresome weed in gardens. The rough stems and leaves, 6-8 in a whorl, with curved prickles, are distinctive. The flowers are 2-3 together, axillary, greenish white. The fruit is rough, with hooked prickles. The name comes from the tenacious globular seed-vessels, which are scattered by clinging to the coat of any animal that touches them. The whole plant is devoured by geese, hence its other name of *Goose Grass*

Cleisthenes, Athenian statesman, opponent of the tyrant Hippas, 511 B.C., founded the Council of Five Hundred, reformed the franchise, and

introduced "ostracism" (political exile). Cleisthenes was the virtual founder of the Athens of Pericles

Clematis, a group of climbing plants belonging to the buttercup family. *Traveller's Joy*, or *Old Man's Beard*, is the only wild species. The second name comes from the autumn appearance of feathered seeds. The numerous hybrid clematises are divided into several sections, the *Patens* section being the earliest to flower, of which *Mrs Quilter*, and *Albert Victor*, are good examples, the *Florida* section include the double varieties, of which *Lucy Lemonie* is a good type; the *Lanuginosa* section includes all the large-flowered types, the *Coccinea* section have red, almost campanulate, flowers. The best method of propagation is grafting on to seedlings of *Traveller's Joy*

Clemenceau, Georges (1841-1929), French statesman, became in 1876 leader of the Extreme Left. A powerful speaker, he was responsible for the defeat of the Gambetta, Ferry, and Brissot Cabinets, and for the downfall of Grévy and Boulanger. He took up journalism in 1893, founding *La Justice*, and as editor of *L'Aurore*, 1903-7, supported Dreyfus. He succeeded Sarrien, 1906, as Premier during the Radical struggle against the Church, and suppressed the Pas-de-Calais strike, but resigned over a dispute on the Navy, 1909. As Editor of *L'Homme Libre* (rechristened *L'Homme Enchaîné* after its suppression), and as Senator, Clemenceau was the scourge of successive governments during the early War years, and the need for an "iron hand" in France led to his formation of the "Victory Cabinet," Nov 1917



Georges Clemenceau

He supported the appointment of Foch as Generalissimo of the Allied Forces and contributed largely to the eventual triumph of 1918. He became the dominating spirit at the Peace Conference 1919 supporting Wilson and Lloyd George in the establishment of new states in Central and E. Europe. These he visualised as buffer states against Germany to whose charge he laid the full guilt of the War. He was wounded by an anarchist during the Conference but recovered.

Retiring in 1920 Clemenceau spent his remaining years in travel and writing. Author of *La Vieille Société* (1894), *Les Plus Forts* (1898), *Grandes et Mises d'une Victoire* and *Un Soir de la Pensée* (1900).

Clemens, Samuel Langhorne, see TWAIN MARK

Clement I, St. (c. A.D. 90) Pope of Rome and one of the Apostolic Fathers (qv). He wrote an Epistle to the Corinthians and is believed to have been martyred.

Clement, the name of 14 Popes. The first was St. CLEMENT of ROME (qv). CLEMENT V pope 1305-14 suppressed the Knights Templars (qv). During his pontificate began (1309) the Babylonian Captivity (qv) of the church. CLEMENT VII pope 1523-34 was defeated by the Emperor Charles V at Pavia in 1525. Rome was sacked in 1527 largely owing to his vacillating policy. CLEMENT VIII pope 1592-1605 strove desperately to free the Papacy from Spanish domination. CLEMENT XIV pope 1769-74 was forced to dissolve the Jesuits (1773). Clement was also the name of two anti popes.

Clement of Alexandria theologian and philosopher lived in the latter part of the 2nd and the early part of the 3rd cent. A.D. He was a theologian who united the tradition of Greek philosophy with the Christian religion considering the latter more as the perfect philosophy than as a religion. He drew on many schools of philosophy for his doctrines in particular the Stoics and Neo-Platonists.

Clementi, Muzio (1752-1831) Italian

composer best known for his *Gravitas ad Parnassum* pianoforte studies. He was a distinguished pianist competing with Mozart in a contest at Vienna in 1781. After a brilliant career as a concert pianist he established in London the music publishing and pianoforte manufacturing business which became Collard & Collard. The greater part of his many compositions have not survived.

Cleon (d. 429 B.C.) Athenian demagogue. The son of a tanner he opposed the aristocratic Pericles on whose death he came into power 429 B.C. His hatred of Sparta prevented the conclusion of an honourable peace 425 and he gained notoriety by the execution of 1000 Mytilenean rebels. He won fame by his unexpected capture of the Spartans in Sphacteria but fell in battle at Amphipolis (422).

Cleopatra (69-30 B.C.) last Queen of Egypt. Of Macedonian descent she became joint ruler with her brother Ptolemy XIV 54 B.C. Exiled by him she retired to Syria and secured the aid of Julius Caesar then in pursuit of Pompey. Ptolemy was slain. Cleopatra was made queen and returned as Caesar's mistress to Rome. On his death in 44 B.C. Cleopatra returned to Egypt and declared Caesarion her son by Caesar joint ruler. Antony rival of Caesar's nephew Octavius now became her lover put Caesarion to death and divorced his own wife Octavia. Defeated by Octavius at Actium Antony stabbed himself on hearing a rumour of Cleopatra's death. Cleopatra failing in her overtures to Octavius now Emperor and fearing the ignominy of capture killed herself by the bite of an asp. See Shakespeare's *Antony and Cleopatra* and Shaw *Caesar and Cleopatra*.

Cleopatra a Needle famous monolith erected at Heliopolis c. 1500 B.C. It originally stood before the great temple there but was afterwards removed to Alexandria by Augustus Caesar. It was presented to England by Mehemet Ali in 1819 and eventually brought to London in 1878. It is of

granite 68½ ft high, and weighs 160 tons. It has been re-erected on the Thames Embankment near Waterloo Bridge. In Central Park, New York, stands its companion, taller and heavier, erected in 1881.

Clepsydra, water-clock of the Greeks and Romans, which measured time by the rate of flow of water through small holes at the bottom of an earthenware globe. It possibly originated in Egypt. See also CLOCKS AND WATCHES.

Clerestory, that part of the walls of a Gothic church which rises above the aisle, containing a row of windows, its purpose being to admit as much light as possible to the nave.

Clergy, ecclesiastical term signifying in the Church of England clerks in holy orders and in the Roman Catholic Church clerks in minor or major orders. The term is used in contrast to the laity, i.e. the body of Christian people not in orders. In its ordinary significance it is used to include Non-conformist ministers as well as Anglican and Catholic priests.

Clergy, Benefit of, see BENEFIT OF CLERGY.

Clermont-Ferrand, French town capital of the Puy-de-Dôme department. It lies in a rich agricultural district and manufactures foodstuffs, rubber wares, especially motor tyres, clothing, preserves, and chemicals. It was an important Roman town. The seat of many ecclesiastical councils, the 1st Crusade was proclaimed here. Buildings of note are the Gothic cathedral, 11th-cent church of Notre Dame and the house in which Pascal was born. Pop 111,750.

Clevite, a uranium-containing mineral, of interest owing to the fact that when heated with dilute sulphuric acid it liberates considerable quantities of occluded helium (*qv*). This occasioned the first recognition of this element on the earth.

Cleveland, port and city of Ohio, U.S.A. An air-port and the sixth largest city in the country, on the S shore of Lake Erie at the mouth of the

Cuyahoga R. Cleveland is well laid out on a plateau, with impressive buildings, museums, squares, and parks. Cleveland is the chief iron-ore centre in the country. There is an extensive lumber, grain and coal trade, and among the most important manufactures are engines, bridges, and automobiles. Petroleum refineries, clothing factories, meat-packing, and the manufacture of paint are other occupations. Cleveland also has the largest fresh fish market in the United States. Pop (1930) 906,500.

Cleveland, Stephen Grover (1837-1905) 22nd and 23th President of the United States, elected Mayor of Buffalo, 1881, and Governor of New York, 1882. Nominated by the Democrats, he defeated J. G. Blaine (*qv*) in the presidential election, 1881. Cleveland was defeated on a tariff issue by B. Harrison, 1888, but was re-elected President, 1892. His emphasis on the Monroe doctrine in the matter of the boundaries of Venezuela and British Guiana, led to a dispute with Great Britain, 1895.

Cleves, town in Rhemish Prussia, capital of the former duchy of Cleves. The chief manufactures include boots, shoes, and machinery. The district, which is growing in popularity as a summer resort, also has some warm mineral springs. Pop (1930) 20,000.

Cleves, Anne of (1515-1557), 4th wife of Henry VIII. Daughter of William, Duke of Juliers, leader of the German Protestants, she married Henry in Jan 1540. Henry, finding her unattractive, and regretting his German alliance, had the marriage declared null in the following July.

Clické [*pron.* KLE'shā], literally, an electrottype or stereotype plate, hence applied to any stereotyped expression or a hackneyed and commonplace piece of phraseology. Their use is the outcome of imaginative poverty or laziness, and sometimes of a woefully inadequate sense of humour.

Click Beetle, also called *Ship-jack*, a beetle related to the fire-flies, which when lying on its back, has the power

of regaining its feet by a rapid jerk, accompanied by a clicking sound produced by the jumping mechanism in its thorax. The larva known as wire worms live in the ground and feed upon the roots of cereals doing much damage to cornfields.

Click, a peculiar variety of speech sound which occurs in the Bushman and Hottentot languages and has spread to certain Bantu languages and even to Cape Dutch (Afrikaners). The sounds almost defy description and their nature is best indicated by the designation *click* which has been given them in English. They are produced by pressing the blade of the tongue against some portion of the teeth ridge or palate and then quickly withdrawing it so as to produce an implosive click.

Clifford, John (1836-1933) Baptist minister born at Sawley in Derbyshire. Educated for the ministry at Nottingham he became minister of Praed St Chapel London in 1854 and Westbourne Park Chapel in 1877. He is most famous for his opposition to the Education Act of 1880 and his advocacy of *passive resistance* i.e. non-payment of school rates by the Nonconformists.

Clifford, William Kingdom (1845-1879) English philosopher and mathematician. Professor at University College London. His mathematical works included treatises and lectures on elliptic functions and non-Euclidean geometry, bi-quaternions and Riemann's surface. His philosophical works deal mostly with the relations between the individual and society especially in ethics. His wife (d. 1909) was a popular writer of children's stories and published many novels including *Mrs. Aethel's Crime* (1885).

Clifton, watering place and W. suburb of Bristol widely renowned for its hot mineral springs and equally famous for its suspension bridge over the Avon gorge. Clifton College (1866) is a Public School.

Climate, the average state of the atmosphere with regard to warmth

wind rain and other variable conditions throughout a long period of time. It is dependent on the interaction of atmospheric conditions such as wind, cloud, temperature and rainfall and on the surface features of the earth itself such as the distribution of land and water, mountains and ocean currents. Hence it may vary considerably in places only a few miles apart.

The chief factor in determining climate is the amount of heat which falls on the earth's surface from the sun. This is called the insolation and its effect is chiefly dependent on the degree of inclination of the sun's rays. A beam of light which covers 1 sq. ft. of surface when falling vertically will at an angle of 30° from the ground be distributed over 2 sq. ft. and hence yield only half the heating effect. It also has to pass through a much greater thickness of atmosphere which still further reduces the heat received. Hence other factors being equal the average conditions throughout the year would be coldest at the poles where the maximum elevation of the sun cannot be more than about 23° and hottest at the Equator where the sun is never far from the overhead position. This is mitigated to some extent by the circumstance that sunlight falls for a longer continuous daily period during summer the farther one is N or S of the Equator where the day can never be longer than 12 hours. Actually the regions of maximum insolation lie about 43° N and S of the Equator though for the two reasons already mentioned these areas have not such high temperatures as the tropics.

The earth has been divided into five zones of climate based on the amount of heat which each receives. These are the Torrid Zone with an average annual temperature of over 68° F., the N and S Temperate Zones in which the temperature ranges from an annual maximum of 68° F. to an average of 50° F., and the N and S Frigid Zones where the annual maximum does not exceed 50° F.

These zones do not, however, correspond in latitude on the two sides of the Equator, as the excess of land in the N and of water in the S hemisphere alter the distribution of solar energy. A *land climate* always tends to extreme conditions, with a wide range of temperature and a small rainfall. A *sea climate* tends towards mildness, a small range of temperature, and a heavy rainfall. To some extent, however, these two types of climate are mingled by the prevailing winds, which in the N hemisphere carry a continental climate some distance seaward along the W shores of the oceans, and carry an oceanic climate some distance inland from the W coasts of the continents.

Varieties of continental climate are *desert, mountain, and littoral*. Deserts are chiefly found about 20° N or S of the Equator, and are less in the S hemisphere because of the greater ocean areas. Desert conditions arise when no rain falls over a large part of the year, and generally occur on the lee side of mountains.

Deserts are characterised by absence of cloud, so that the sun rapidly dries up any moisture present, and heats the rocks highly during the day, but at night the loss of heat by radiation is excessive, and the consequent contraction of the rocks causes them to crack and break up. This is the chief weathering agent in deserts, where there is seldom any frost, little rain, and few rivers. The wind, in the absence of vegetation, blows the sand about, scratching and polishing the rocks.

Mountains exercise a great effect on climate, partly by reason of the decrease in temperature and pressure with altitude, and the greater insolation in the more rarefied air, but chiefly, especially when near a coast, by acting as a barrier to moisture-laden winds, which are deflected up into colder regions where they deposit some of their moisture as rain. The zone of maximum rainfall is at about 7000 ft in temperate regions. High mountains

have a lower pressure in winter than in summer, as the colder air is then compressed at low levels, for which reason also the temperature in winter is higher on the mountains than in the valleys below.

High mountains are capped with snow, even at the Equator, where the snow line, above which snow will not melt, is at an altitude of about 16,000 ft. In Switzerland it is at 9000 ft, in Norway about 5000 ft, and in the Arctic regions at sea-level. Littoral or coast climates grade between continental and marine, being largely dependent on the direction of the prevailing wind. If this is off-shore, the climate is the usual continental type, modified by moderate seasonal change and small range of temperature; if the wind is from the ocean, the climate is marine. Coasts facing to windward usually get rain and sea breezes, especially in the tropics. Deserts may reach the sea on the leeward coast, especially in the zone of trade winds.

Wind systems have occasionally been made the basis for a classification of climates. This has also the advantage of embodying a classification by rainfall, which is closely connected with the wind systems. On each side of the tropical zone are the zones of trade winds, including the seasonal monsoon zone. Then follow the sub-tropical belts with W winds alternating with trade winds, outside which are the temperate zones with W and SW winds extending into the polar regions. A polar zone is, however, included.

Sometimes a category of monsoon climates is recognised, chiefly because monsoons cover large areas of the interior of tropical countries as well as the coasts. The climate of India is much influenced by the winter and summer monsoons. The former is typically off-shore, and produces a cold season with little rain, the latter is an ocean wind, bringing heavy rain from the SW. Monsoons also occur on a smaller scale on the E coast of Asia.

The influence of ocean currents on climate is shown by the difference in temperature on the E and W sides of the N Atlantic Ocean. The warm Gulf Stream from the Caribbean Sea sweeps past the NW coast of Europe while a cold current from the Arctic flows along the coast of Labrador. Hence in winter the difference in temperature between places of the same latitude but on different sides of the ocean may be as great as 40 °F. An extreme instance of this difference is furnished by the Lofoten Islands off the coast of Norway and the town of Verkhoyansk in E Siberia both of which are just within the Arctic Circle. In summer these are at the same temperature of about 55 °F but in winter the temperature at the Lofoten Islands under the influence of the Gulf Stream falls only to 30 °F while that of Verkhoyansk with a continental climate falls by 116 °F to -61 °F. The difference is 93 °F. See also ATMOSPHERIC RAINFALL and WEATHER.

Climbing Perch, a fresh water fish 8 in long with a compressed body and a long spiny dorsal fin. It is found in India and countries to the E and can travel long distances on land breathing air by means of a bony labyrinth richly supplied with blood vessels and situated in the upper part of the branchial chamber.

Climbing Plants are divided by Darwin into 4 classes. The first group twine spirally round a support the second are aided by sensitive modified leaves branches or flower stems. These two grade into one another. The third ascend by the aid of hooks and the fourth by rootlets.

The ivy climbs by rootlets, bramble and some roses by hooks. Plants of the first and second classes are the more interesting and these Darwin specially studied. He found that the fourth and subsequent internodes of hop seedlings bent to one side and described a circle moving with the sun at an average rate for each

revolution of 2 hours 8 minutes during the day in hot weather. In this way the young stem encircled any convenient support within its area of movement. Three or four internodes from the growing point retain their power of movement the older ones becoming rigid. *Clematis* (traveller's joy) and *Tropaeolum* (garden nasturtium) climb by clasping petioles. Some plants have elongated leaf tips which are sensitive and embrace a support. Tendrils are filamentary organs sensitive to contact used exclusively for climbing and formed by modification of leaves branches or stipules. In the sweet pea five leaflets of the compound leaf are transformed into tendrils. Tendrils frequently have the same power of revolving as the young hop stem. All are sensitive to touch and curve towards the touched side.

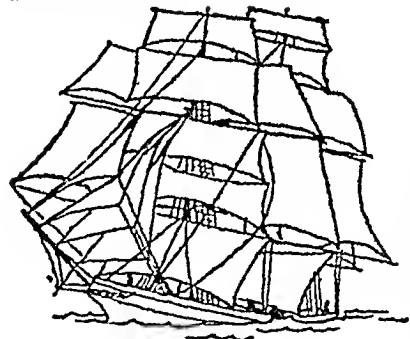
Clinical Thermometer and TEMPERATURE MEASUREMENT

Clinton, De Witt (1769-1848) American politician inaugurated the spoils system in New York. He was Mayor of New York three times 1803-15 and Governor 1811-23. Clinton worked for the completion of the Erie Canal scheme the extension of education and the abolition of slavery and of imprisonment for debt.

Clinton, Sir Henry (c 1738-1795) British general. Entered the British forces in New York later serving in the Seven Years War and the American War of Independence succeeding Howe as British Commander in Chief in N America 1778. He was elected to the British Parliament 1790 and made Governor of Gibraltar in 1794.

Clipper a sailing vessel built for fast voyages longer narrower and carrying heavier sail than a normal ship. The heyday of clipper-ships was in the fifties and sixties of the 19th cent when they were used for the tea trade with China. In 1866 the *Seneca* returned from Foochow in 99 days; and an American clipper was

have made 436 m in 24 hours
also SHIPPING



CUTTY SARK 1869

A Famous Clipper

Clitheroe, market town in Lanes, situated at the foot of Pendle Hill in the Ribblesdale valley. It was once part of the Duchy of Lancaster. The 3-day fairs (in March and Dec) date from the Charter of 1283. There are the remains of a 12th-cent castle and a 16th-cent grammar school. Industries include cotton and paper-making. Pop (1931) 8644.

Clive, Robert, Baron (1725-1774), British general, and administrator in India, entered the E India Company's service as a "writer" at Madras in 1744. On the capture of Madras by the French in 1746, Clive escaped to Fort St David, and served with the British forces under Major Lawrence till the peace of Aix-la-Chapelle, 1748, when he returned to the E India Company. In the struggle for the control of the Deccan and the Carnatic, between Chanda Sahib, ally of the French leader, Duplex, and Mohammed Ali, favoured by the British, Clive was given a command, and won fame by his capture of Arcot, 1751. He was invalided home in 1753, but on the renewal of warfare in 1755 he returned to India as Lieutenant-Colonel, and Governor of Fort St David. He captured Bombay, and advanced on

Calcutta, where at Plassey (1757) he defeated Suraj-ud-Dowla, Nawab of Bengal, who had imprisoned his English captives in the "Black Hole".

After thus definitely establishing British supremacy in India, he served as Governor of Bengal till 1760, when he returned to England, was elected M P for Shrewsbury, and was given an Irish peerage in 1762, retaining his seat in the Commons till 1774. In 1764 he again went to India to reorganise the civil and military administration, but returned to England owing to ill-health 2 years later. He was charged with abuse of office in India, but the Parliamentary commission of enquiry acquitted him, acknowledging his services. He died by his own hand shortly afterwards.

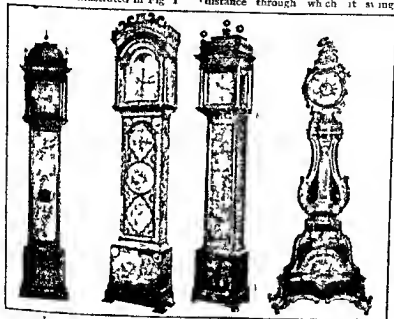
Clocks and Watches Some means of measuring time is a necessity to any civilisation, but the employment of mechanism for this purpose seems to have been a European invention made round about the year A D 1000. The ancients depended upon the *clepsydra*, or *water-clock*, consisting of a vessel containing water which escapes through a small hole. It would appear, however, that the mechanism for indicating and striking the hours was fitted to water-clocks as early as the 6th cent., it was rather the discipline of monastic life than the necessities of civil life that brought them into being. It was not a long step to driving the mechanism by means of a weight, but the invention of a means for regulating its speed took place in two stages. The first was the invention of the *escapement*, a device by which the train of wheels, subjected to a continuous driving force from a weight or spring, is allowed to move step by step only. The second stage was the application of the *pendulum* to regulating the step-by-step motion of the escapement. The pendulum was preceded by the use of the *foliot* attached to a *verge* escapement, the foliot consisting of two small bob weights attached to a bar, the timing depending upon their inertia. The proper

application of a spring control to a shot would lead to a balance wheel but in early clocks this was not done and consequently the time-keeping was very erratic.

The verge escapement consists of a crown escape wheel and a pair of pallets on an arbor then called the verge this is illustrated in Fig 1

not until 1657 that Huygens published his invention of the pendulum clock which he at once developed into an instrument of comparative precision by a thorough investigation of its principles

The ordinary pendulum is not truly isochronous that is to say its time of swing is not quite independent of the distance through which it swings



- (i) William and Mary Grandfather Clock (5 ft. in height) in walnut and mahogany by John Andrews
 (ii) Coloured and Gold Lacquer Clock by Isaac Nicks of Wells (c. 1740)
 (iii) Walnut Case Clock by Thomas Tompion
 (iv) Louis XV Clock (5 ft. in height) with case of holly wood.

Galileo discovered the law of the pendulum and left behind him suggestions for adapting it to clocks but he himself employed the water-clock for his mechanical experiments. The familiar story runs that in 1581 he noticed the swinging of candelabra in a cathedral and came to the conclusion that the time of each swing was independent of its amplitude. It was

This would be the case only if the restoring force of gravity were exactly proportional to the displacement. By suspending a pendulum from a flat spring we not only abolish friction, but also lessen its effects the length as it deflects which is what is required to help towards rendering it isochronous. But in all accurate clocks the arc varies as little as possible.

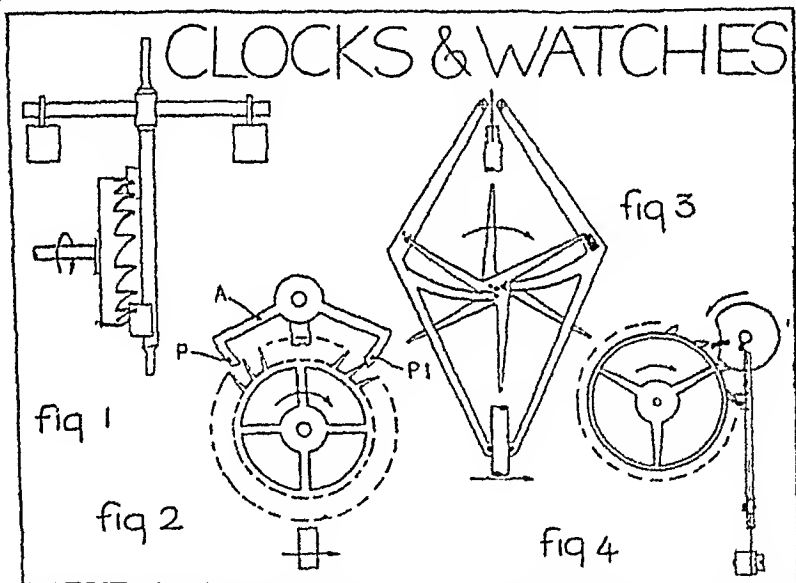
The factors determining the time-keeping capabilities of a pendulum are: (1) constancy of its length, (2) the force of gravity, (3) its nearness to isochronism.

In a watch or a chronometer, in general, the same conditions apply, only that the effect of the balance spring takes the place of the force of gravity.

In a clock the effective length of the pendulum would be disturbed by tem-

perature variations, has become very general for pendulum rods.

The mechanism by which the pendulum is kept swinging can now be considered. Fig 2 shows a *dead-beat escapement* (Graham, 1715), the escape wheel of which would be connected by a train of wheels and pinions to a barrel arranged to be turned by the descent of a weight. The *anchor* A swings with the pendulum, to which it is coupled by the *crutch*. This anchor



perature variations unless means were adopted to compensate for this. The simplest arrangement is a wooden rod, the upward expansion of (half of) the height of the bob can be arranged approximately to neutralise the downward expansion of the rod. Considerably more accurate, however, is the zinc tube compensation commonly used in *turret clocks*, or the steel and mercury form which was largely used for *regulators*. Of recent years the use of Invar steel (*qv*), a nickel steel alloy with an almost zero co-efficient

carries *pallets* P and P1, in the figure the pendulum is moving towards the right, and a tooth of the escape wheel is sliding down the sloped or impulse face of pallet P1, and in doing so the force of the driving weight is thus applied to the pendulum, but when the tooth escapes from P1 the pendulum continues moving to the right and another tooth drops upon the flat, or "dead" face of pallet P. On the return swing the action is similar. The distance a tooth has to "drop" on to a dead face should be as small

as possible for this drop is destructive.

We may now consider the isochronism of this form of escapement. An increase in the force on the escape wheel tends to increase the arc it also usually tends to reduce the effective force of gravity both of which changes would tend to make the clock go slow. But it increases both the pressure and the length of run of the teeth on the dead faces and this affects indirectly the value of gravity—acting as a brake which though highly undesirable tends to check the arc and thus help towards isochronism.

The dead beat escapement has never been largely used for English clocks of the cheaper grades such as office dials the recoil escapement having been invariably used for these as also for most of the grandfather clocks of past decades.

Historically the recoil escapement came before the dead beat but it is simplest to regard it as very like a dead beat except that it has no dead surfaces on the pallets but instead has quite steep surfaces so that with an increasing arc (tending to make the clock go slow) the escape wheel is compelled to recoil against its own driving force. This is in effect similar to making the pendulum deflect a spring at the outward part of its swing it increases the value of gravity and thus tends to make the clock go fast. Consequently a well-constructed recoil escapement is able to keep moderately good time in spite of considerable variations in driving force and so is quite suitable for a spring-driven clock. Recoil escapements are sometimes met with in old turret clocks but are usually badly worn.

From the foregoing it will have been observed that the ideal clock escapement should deliver to its pendulum a constant impulse and that locking friction should be as small as possible. Thus of course is a matter of degree a clock that performs to a minute or so a month is a useful house-clock one that can go to a second or

so a month is quite a superior regulator whilst one that can go to a second or so a year is fit for observatory use. It has been said that a clock can measure time more accurately than any other instrument can measure anything else. The same of *regulation* or timing of a clock must not be confused (though it frequently is) with its *rate*. The former depends upon the care in adjusting the position of the bob but the latter is a measure of uniformity. A good clock is provided with a tray usually attached about one third down the length of the pendulum and after preliminary adjustment of the bob all further regulating is done by adding or subtracting little weights at the tray. This avoids having to disturb the swinging of the pendulum, for that would introduce temporary (and in some cases permanent) variations in its rate.

The escapements so far considered are of the simple anchor type but in notion must now be made of other superior escapements. Of these the *Grimthorpe Gravity escapement* and the *Rusler* are the most notable the former for having achieved the the great clock *Le Gen at Westminster*—and for a world wide adoption since and the latter for having set up a new standard of accuracy for observatory clocks.

The *Grimthorpe* escapement is illustrated in Fig 3. The impulse is given by the gravity arm. The escape wheel in turning lifts each gravity arm through a fixed distance just after the pendulum has left it—thus it has a constant impulse irrespective of the lack of co-tenancy of force at the escape wheel. The locking friction is greatly reduced because the pallet *legs* are of long teeth (or there is no run and consequently the pendulum is free to complete its swing without any friction from the escape wheel).

In the *Rusler* escapement the pendulum is hung on a rock

turn is pivoted on agates, and its motion limited between two stops, this rocker also carries an anchor and pallets embracing the escape wheel. Both the pallets and escape wheel are duplicate, but arranged so that one combination serves to lock the escape wheel, whilst the other (with teeth and pallets facing the other way) serves to push the rocker over. The action is thus as the pendulum swings across it causes the rocker to trip, and become flicked over to its other position, and this transmits the impulse to the pendulum by the slight deflection of the pendulum suspension springs (a pair of small springs are used). The rocker now remains at rest in its new position until the return swing of the pendulum when the rocker returns similarly to the other position.

The actual arc at which a clock's pendulum works represents a fine balance of the various factors concerned, amongst which of course is friction. There is the friction of the mechanism and there is air resistance. With a variation of any one factor therefore must come a variation of arc. Hence, not only are the working parts of a precision clock made to perform with as little friction as possible, but the whole clock is often arranged to work in a vacuum which eliminates variations due to barometric conditions. To facilitate this enclosure it is usual to drive the clock electrically instead of by a weight wound up by hand.

The idea of a portable clock must be almost as old as the clock itself, but the workmanship required was no doubt far beyond the resources of the old "clock smiths" of the early centuries. But c 1500 a locksmith of Nuremberg invented the *main-spring*, a flat spring coiled into a barrel, and soon the first *watches* were made. These were in quite large cylindrical boxes or cases, but later on the external shape became improved, and the size reduced, the *Nuremberg eggs* were so called because not only were the corners curved but the cases were

elongated and in contour very much resembled eggs.

The movements of these watches consisted of plates into which were fitted the main-spring in its barrel, the necessary train of wheels and pinions, and a verge escapement and foliot balance. The whole formed a very inferior time-keeper. But improvements were soon wrought, both to provide means of equalising the torque of the main-spring and to provide an improved device to regulate the progression of the wheels. The former resulted in the *fusee*, a conical drum with a helical groove cut in it to receive a cord or chain, the other end of which is wound over the outside of the main-spring barrel. The main-spring therefore drives the fusee by means of the cord, and as the spring runs down the cord ascends into the turns of the fusee, which have ever-increasing radius, thus compensating for the decreasing pull on the cord.

Improvements in the escapement form the chief subject both in the history of watches and of clocks. In the earliest watches the escapement consisted of a "verge" and pallets with a "foliot." The use of a hog's bristle to hasten the return swing of the foliot was the first improvement, and in 1658 Hooke invented the *balance spring*, after which the foliot became a *balance wheel* and in principle exactly as we have it to-day. Watches with verge escapement and balance wheels have continued to give good service to many generations, and some are in use to this day. In 1695 Thomas Tompion invented the *cylinder*, or *horizontal* escapement. It was improved 1720 by George Graham. This escapement is still in common use. Its escape wheel lies in the same plane as the other wheels, and has peculiar teeth, like small triangular leaves standing up on little stalks, the cylinder forms the balance staff in place of the verge, and this cylinder has parts cut away, so that the triangular teeth may pass through the inside of the cylinder, and in doing so, both at entering and leav-

ing give an impulse to the balance wheel by pressing against the cut-away edge of the cylinder. At other times the cylinder locks the wheel alternately against the inside and the outside walls, so that no impulse is given except at the required times. In 1724 came the *duplex* a French invention though it was manufactured considerably in this country. In this the escape wheel has alternate long and short teeth the long ones passing through a notch or groove in the balance staff and the short ones which



See Fig. 16th cut. Believed to have been used by John Milton, the poet.

are raised give an impulse through a pin on the balance wheel at alternate swings.

In 1763 Mudge invented the *lever* escapement. In this the escape wheel acts upon an anchor as in a clock and the anchor is connected to the balance wheel by a lever which moves between two fixed pins. The end of the lever has a slot into which a pin on the balance wheel enters, moves the lever to its other position and then leaves it whilst the balance continues its swing. On return it re-engages the lever and each time the lever moves across an impulse is given to the balance wheel.

The escape wheel teeth and the pallets are so arranged that the lever gets slightly drawn to ards its banking pins. Also a safety roller on the balance staff to ether with a small finger on the end of the lever acts to ensure that from the time the balance wheel swings clear of the lever to the time it returns the lever lies clear of the balance wheel. This degree of detachment contributes considerably to its superior time-keeping. The lever escapement is the most used at the present time both for fine watches and for cheap ones.

The *chronometer* is of very much larger calibre than a watch and has always been regarded as the highest class of construction of all horological mechanisms. It employs a special escapement which has impulse arrangement very similar to that of the *duplex* but the support for the impulse pallet also forms a safety roller to render tripping impossible. The locking of the escape wheel is unique and consists of a pallet set on a detent having a tiny passing spring which with a projection from the balance staff causes the escape wheel to be unlocked just after the impulse pallet passes a tooth of the wheel. At other times the detent is undisturbed and the balance wheel is completely detached during most of its time.

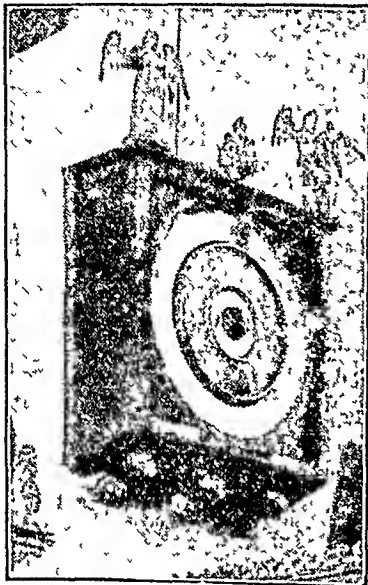
Temperature Compensation. A balance wheel and spring constitutes the equivalent of a pendulum the spring acting on the mass analogously to the force of gravity in the case of the pendulum. Temperature changes can be compensated for in the pendulum by merely maintaining constant effective length but with a watch or a chronometer besides maintaining the effective radius of the balance wheel it is necessary to vary that correction so that the net result of the springs variation also shall be included in the matter. Very few watches are at all accurately compensated except perhaps the very highest grade but this is essential in chronometers. The rim of the balance wheel is bimetallic and

carries several means for effecting accurately the necessary adjustments

Electric Clocks Probably the earliest electric clock was that of Alexander

Bain, the pendulum is maintained proportional to its needs at a given arc (instead of the incorrect arrangement of the Bain clock) To effect this the Hipp pendulum uses a trailing nib, which passes to and fro over a block with a notch, when the arc declines so that the nib fails to clear the edge of the block it engages the notch during the return swing of the pendulum and makes a contact which causes a magnetic impulse to be given to the pendulum Clocks with this device are in use quite extensively, and are capable of very good time-keeping

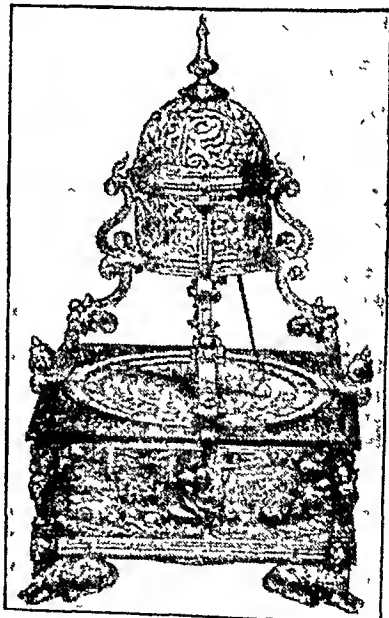
Practical progress began in 1895 with the invention of the original *Synchrone* clock (Bowell) which, owing largely to the untiring efforts of



Astronomical Clock at Wimborne Minster,
the oldest working clock in England

Bain made in 1840, when electrical apparatus was relatively crude In Bain's clock the pendulum bob was formed by a coil of wire arranged to swing over a permanent-magnet, about half-way up the pendulum was a little sliding bar which controlled the current through the coil, so that the pendulum was kept swinging by the current This arrangement could not have been satisfactory, as the rate of the clock was directly affected by variation in *c m f* of the battery In this clock the pendulum propelled the dial-work

The next electric clock (1843) was invented by Dr Hipp, of Neuchâtel, it has a pendulum kept swinging by an electro-magnet Irrespective of variation in battery *c m f*, the impuls-



German Horizontal Clock (c 1600)

Hope-Jones, started the commercial adoption of electric clocks, the synchrone is now in very extensive use, together with various other systems

both contemporary and of more recent times, of which should be mentioned those of Gent, Gillett & Johnston and Mercer. The original synchronome escapement was discarded and a direct half minute impulse to the pendulum adopted instead.

With this type of clock the dial work is not driven from the pendulum but by a half minute jumper movement in circuit with the impulsing contact. Any number of dials of any size can be actuated by the same master clock. The clock on a well known church in the Strand is but a jumper connected into the circuit of a large installation at a near by block of office buildings.

The original type of jumper movement (Bowell) in which an electro-magnet drives the hands by a ratchet and pawl is still extensively used though another and silent type in which a snail-shaped armature is turned by the joint action of an electro-magnet and a permanent magnet has also considerable vogue and was devised by the same inventor.

Various forms of single or self contained electric clocks have also been brought out in recent times though for cheap clocks the main spring still remains the most suitable. For observatory clocks and other accurate purposes they are used in various forms. The *Shortt clock* is used at Greenwich and other observatories. It has a free pendulum swinging in a vacuum and impulsed at regular intervals by a gravity arm magnetically released by a contact made by a *slava pendulum* which is forced to synchronise with the free pendulum by a circuit closed by the gravity arm. The free pendulum is thus entirely released from all work and keeps time more accurately than any clock devised until the recent development of the quartz oscillator (see below). Instead of a slave pendulum an electric motor may be used to do the work, controlled in its rate by a pendulum. The hands of such a clock move continuously. In

pallet escapement is used which the pendulum normally misses entirely and hence is able to swing quite freely. Only in rare intervals of over running does the pendulum touch the escape ment. This clock is simple in construction and is used for turret clocks and marine chronometers as well as small clocks.

The most recent development is the synchronous motor clock driven from the alternating-current supply main by means of a synchronous motor (see *ELECTRIC MOTORS*). This depends for its rate on the frequency of the supply which is maintained constant at the supply station by attention to the rate of a clock in the station. Such clocks are compact and cheap and the extension of the grid system in England with universally synchronised frequency is leading to their wide adoption. The most accurate time keeping device ever made depends upon the same principle but the alternating current for driving it is provided by a quartz oscillator (see *PIZZO ELECTRIC EFFECT*). This clock exposes the error caused in the pendulum clock by the varying attraction of the moon and keeps time to a very small fraction of a second per annum.

CONSULT V E Haswell *Horology* (London 1908).

Clodd Edward (1840-1930) English banker anthropologist and agnostic author of *The Story of Creation* (1888) *The Childhood of the World* (1873) *Primæ Man* (1895) etc and *Memoirs* (1916).

Clogs a form of footwear made entirely from wood (*sabots*) and still worn in Holland and to some extent in France and other European countries or with wooden soles and leather uppers (*pattens*) common among mill workers and farm labourers in the Midlands and North of England. The soles of pattens are made from wood 2 in thick hollowed and shaped inside to fit the foot. The uppers fit into a groove in the sole and are attached by a strap of leather.

warm, dry, and comfortable in the damp of factory floors and the slush of farmyards

Cloister, or **Close**, an enclosed space, surrounded by covered passages open at the inner sides, in connection with monastic, cathedral, or collegiate buildings. In monasteries the centre is often used for a burial-ground

Clonmacnoise, a parish of King's County, Irish Free State, and a famous early Christian centre. There are many interesting ancient ruins, including those of the 6th-cent abbey, the Seven Churches of Clonmacnoise. Pop 1900

Clonmel, market town in co. Tipperary on the R. Suir. As a fortified town it was besieged and captured by Cromwell in 1650. Brewing and tanning are carried on, whilst the exports include agricultural and dairy produce. Pop 9000

Closed Shop, a factory or workshop in which only trade union labour is permitted by the workers. The term is American, corresponding to the "Union Shop" in England

Closure, a method of ending a debate by a motion "that the question be now put". If the Chairman accepts the motion and it is carried, further debate on the subject must cease

Cloth, see **FRUITILLS**

Clothes-Moth, a general name for a great variety of small, so-called tineine moths, the larvae of which feed mainly on dried animal substances, many of them being very destructive to woollen goods, furs, etc. Camphor and naphthalene are the best substances for checking the mischief

Clothing: The Modern Trend of Modes and Styles. It has been vaguely realised for years that the sun's rays have a beneficial effect on health, and recent scientific discoveries have confirmed this. The World War, which freed many women to undertake men's work, caused a revulsion against feminine trappings such as frilly petticoats, and the adoption of riding breeches and shorts instead.

Beauty culturists have realised that

their efforts are unavailing unless various health rules are observed, such as the free movement of the body, unhampered by constricting clothing. Development has been gradual, though somewhat accelerated since the World War. Sleeveless day dresses, which caused such a commotion a few years back, have been accepted, and followed by backless day and evening gowns, as well as stockingless legs during the summer.

The slim silhouette which fashion has decreed has faced corsetières with a difficult problem. To mould the figure into shape, without in any way disturbing the function of internal organs by misplaced constriction, has required careful forethought. Instead of the many-boned, armour-like garments of the past, surgical elastic and strappings now support weak and sagging abdominal muscles in exactly the right place. With the emancipation of women there has developed a greater and more general keenness in sport, games, and exercise.

Muscles have developed under this régime, becoming harder, and in many cases needing no artificial support. For such support as may still be needed, the corset has been replaced by a suspender belt or by straps arranged so as to throw the strain across the back and away from the hips.

Cotton and cambrie and flannel underclothing have been replaced by very simple garments of silk, artificial silk and cellular fabric, the latter permitting the free access of air.

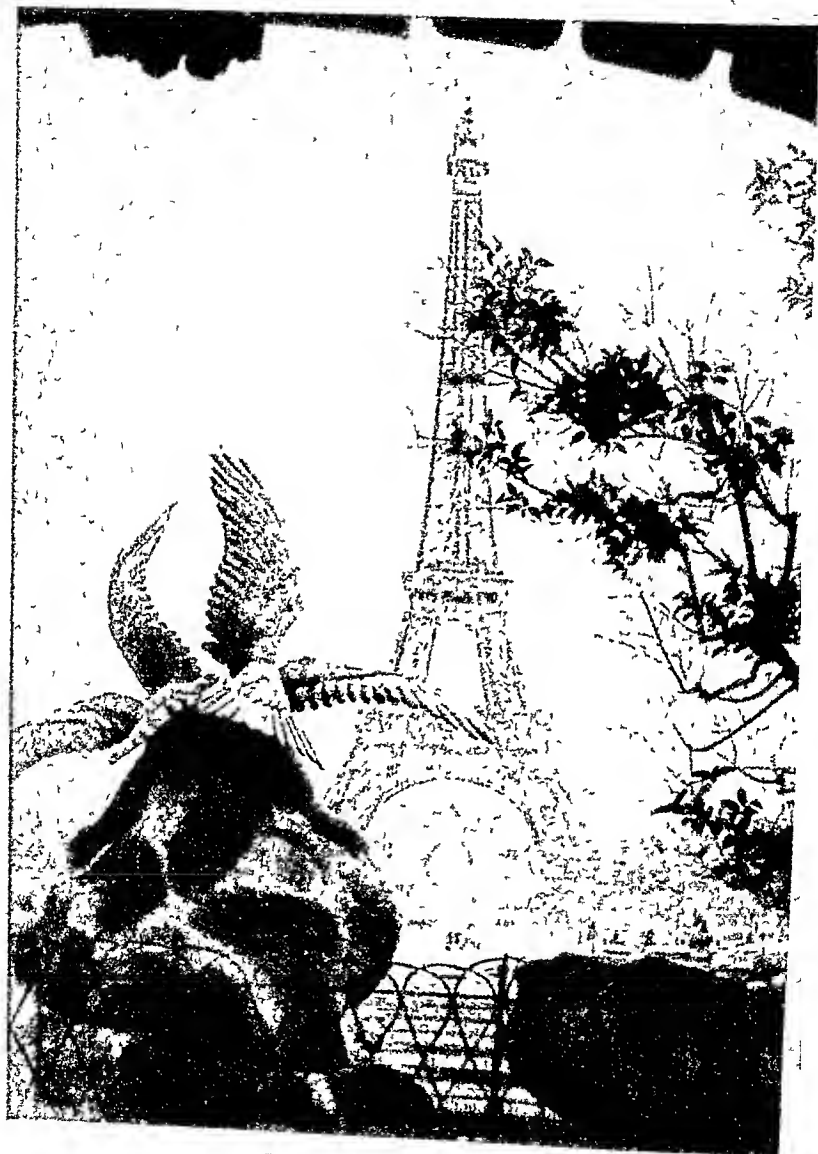
Dearer labour, and less time for home dress-making have led fashion along simple lines. Lack of time forbids the introduction of complicated underlinings, innumerable fasteners, and detailed decoration.

There has been a tendency, however, to adapt past styles to modern requirements.

The simplicity of modern attire may have given rise to the accessories which brighten and change the tone of an outfit. Thus cotton gloves with



PANEL OF ELIZABETHAN EMBROIDERY



THE EIFFEL TOWER, PARIS

frills gloves with ruffled sleeves attached to the elbow handbags and scarves to match bows little coats and so on may by their addition change the character of a dress or coat

Court shoes which are suitable for indoor and outdoor use serve well for the busy and active modern life. Other shoes which have developed into a few straps judiciously placed satisfy the demand for less constriction and more exposure. Uppers which are perforated and often composed of netlike material should satisfy the hygienists. Footwear of varying colours adds a cheering note.

Children's feet are no longer pinched into shoes of unnatural shape or stiff boots which in giving unnatural support weakened the muscles.

No garment probably demonstrates more clearly the change in attitude towards the necessity of outer covering than the bathing costume. This garment has risen from its prime seclusion being taken out a few times a year for a dip in the sea. It now forms an important part of the summer outfit different types being used according to the occasion. Thus the swim suit for swimming the semi-sun for swimming and sun bathing and the sun suit for sun bathing only.

The jumper in its fancy and shirt blouse styles and the cardigan fulfil the need of the modern woman who requires a garment which is easy to launder does not crush is comfortable to wear and an excellent means of introducing colour.

Hats cover only part of the head so that curls and waves of the modern coiffure will not be lost to view. The beret continues changing its angle with the fashion.

No startling innovation has occurred in men's clothing beyond the introduction of more colour into their shirts and ties and the increased popularity of pullovers. Old fashions in hats are frequently resuscitated and slight modifications in various parts of suits are made from time to time—to increase

their comfort or at the dictates of fashion. Some trousers are adapted for use with belts instead of braces plus fours with their roominess giving greater freedom of movement and eliminating the bagging of the cloth around the knees experienced in trousers have come to stay. Lapels of coats are altered in breadth the number of buttons to be worn on the sleeve is reduced or increased the waistcoat becomes double or single breasted and so on.

The changes are so gradual that they are hardly noticed and yet looking back a hundred years it will be realised that the fashions of men as well as women are following lines of greater comfort and utility.

Clothing Care of.

Hats. The crown of the hat should be filled with tissue paper after removing it from the head and placed on a hat stand which will help to preserve its shape. When packing for the week-end a dressing-case with a circular division on the bottom helps to lengthen the life of a hat.

To Renovate. Black straw hats can be improved in shape and gloss by painting them over with a little black ink mixed with gum. Fuller's earth rubbed into light-coloured straws removes the dirt if thoroughly brushed out afterwards. A solution of oxalic acid ($\frac{1}{2}$ oz.—1 pint) will restore the whiteness of white straw and the beaten white of an egg will stiffen and improve its shape. The shape of a straw hat is restored if it is held in front of the steam from a kettle and gradually moulded back into shape while it is damp.

Felt Hats are best cleaned with petrol (inflammable) or carbon tetrachloride (non inflammable). A black felt is improved by sponging with ammonia.

Coats Dresses and Suits last much longer if coat hangers are used. In the case of men's suits the jacket should be brushed and hung on a hanger immediately after use and the trousers hung upside down on trouser bar.

pockets should be emptied every time a suit is taken off. Periodic ironing by expert tailors of suits and trousers preserves their shape and prolongs their life. In the case of women's clothes the coat-hanger should have two hooks for the skirt.

Complete immersion in petrol will cleanse suits and costumes. Grease and other spots can sometimes be removed satisfactorily by applying carbon tetrachloride with a soft rag, on a special brush, which has a little reservoir in the back from which the liquid trickles down the bristles. To prevent the grease spot from spreading, a ring of solvent should be made around the spot and a pad of absorbent matter placed underneath. Ammonia will sometimes effectively remove grease-spots, but should be used with care, owing to its effect on some colours.

A shiny surface to a cloth can be removed by rubbing with emery paper, or with a piece of flannel dipped in turpentine.

Mackintoshes Dirt can be removed by scrubbing, and the colour revived by rinsing in water to which 1-2 teaspoonfuls of vinegar has been added.

Shoes Trees placed in the shoes immediately after removal do much to keep their shape. The best trees are of wood, made for the shoes, though aluminium trees are useful for travelling.

Squeaking can be stopped by soaking first in salt and water and then in linseed oil. Leather which has hardened with use will soften with the application of castor oil after washing in warm water. Periodic dressing with dubbin preserves the leather and prevents it from cracking.

Suede leather shoes are improved by rubbing up the shiny parts with emery on a wire brush, and applying black ink or special liquid shoe-dye to the parts which have lost their colour.

Shoes may be water-proofed by applying warm castor oil to the soles and allowing it to soak in.

Vaseline and olive-oil rubbed in

from time to time will prevent patent leather from cracking.

Brown shoes can be blackened with black ink, first removing all polish with a weak solution of ammonia. Lemon will remove some stains from brown shoes.

Fur Coats and Furs, during the summer months, when moths are most active, should be put in cold storage. Failing this, wrapping in newspaper will protect them, for moths dislike printer's ink. White furs may be cleaned by rubbing calcined magnesia into them, then shaking it out and rubbing with a dry cloth. Dry, hot bran is used for removing the dirt from dark furs.

Mending Holes or tears in expensive material are best dealt with by an invisible-mending firm.

Darns in cotton or linen should be done in the same way as with stockings. A piece of new material placed under a thin part, and used as a foundation for a darn, strengthens it considerably.

A three-cornered tear is drawn together, roughly over a patch, and then darned with a fine thread running backwards and forwards over the foundation.

Frayed shirt-cuffs can be either mended by turning or more simply, when bought from well-known reputable firms, returned for new cuffs. The cost is inconsiderable, and the life of the shirt is renewed.

Holes in jumpers, and similar woollen garments, can be mended inconspicuously by imitating the stitch with a darning needle, and self-coloured wool. Stocking stitch is done by passing the darning needle under two of the strands connecting the ends of the hole, and through the two next loops above.

Darns in thin woollen materials or over large holes in stockings last longer and are easier to carry out if done on to some soft net stitched into position underneath.

Ladders can be stopped by applying soap, or one of the many patent solutions invented for this purpose. In-

visible mending costs so little that expensive stockings well merit the price paid. With a little practice home invisible mending can be done with a patent device like a crotchet hook with a movable projecting arm.

Tears in macintoshes can be mended by drawing the edges together and sticking down with adhesive tape or using the rubber solution and patches supplied in a puncture outfit.

The mending of shoes and boots at home is not a practical proposition unless the family is sufficiently large to justify the cost of buying the necessary outfit: 2 lasts, 2 leather cutters, knives, a hammer (of special design), a rasper, a glazer and a pair of pincers are essential.

Rubber heels however are easily attached by means of a few screws.

Cloudburst, see WINDS.

Clouded Leopard, or Clouded Tiger a large species of wild cat ranging from Nepal E. to Borneo. It has a relatively large head, short legs and a long tail and its pattern consists of large black-edged dark patches. It is 6 ft. in total length and weighs between 40 and 50 lb. It lives in the forest feeding upon birds and small mammals but is not closely related either to the leopard or the tiger.

Clouds are vapour condensed into liquid masses in the atmosphere; they are distinguished from mist by the height at which they occur above the ground.

Various schemes for the classification of clouds have been put forward but the one now almost universally adopted and amplified by Sir Napier Shaw is that of the International Cloud Atlas which bases its classification on the height at which the various types of cloud occur.

In the first category included are clouds with an average height of 30,000 ft. which are called Upper Clouds; are two types: cirrus and cirro-stratus. The cirrus clouds are a mist of minute ice specks and generally resemble tufts or curls of snow-white hair; they may also be feathery in appearance. The

cirro-stratus clouds are whitish and often extend over the sky in a thin sheet frequently giving rise to halos round the sun or moon. Both these types of high cloud especially the cirrus clouds are sometimes called *mare's tails*.

To the second category of clouds of intermediate height occurring at from 10,000 to about 24,000 ft. belong the cirro-cumulus, the alto-cumulus and the alto-stratus clouds.

Cirro-cumulus clouds occur in rounded tufts which often cover the whole sky in summer giving rise to a mackerel sky or else in white flakes.

Alto-cumulus clouds are also arranged in lines which often join in places. They are large white clouds.

Alto-stratus clouds vary from a type resembling a dense cirro-stratus cloud to a thick grey sheet.

The third category includes the low clouds found at altitudes up to 6,000 ft. This embraces two types: the strato-cumulus and the nimbus. The strato-cumulus clouds are the familiar dull grey clouds of winter which produce the so-called leaden sky from which however no rain actually falls.

The nimbus clouds are rain clouds and have a dark grey ragged stormy appearance.

Into a fourth category of clouds of Diurnal Ascending Currents are placed two types of cloud: the cumulus and cumulo-nimbus.

Cumulus clouds are the great white billowy clouds so frequently seen in summer. They have a flat base usually at a height of 4,500 ft. and a rounded upper surface rising to 6,000 ft. or so.

Cumulo-nimbus clouds often rise into beautiful shapes. Their base is at an altitude of 4,500 ft. but their apex may stretch up to more than 70,000 ft. and often makes an impressive sight when reflecting the sunlight. Showers and thunder are often associated with this type of clouds.

As implied by the name of the group in which they are placed both

these last types of cloud are formed by vapour condensing in ascending currents of air

Finally, there is a fifth class, that of high fogs. These occur below 3500 ft., and are termed stratus clouds. They are like sheets of fog at some distance from the ground, and when seen from a distance appear as sheets lying parallel to the horizon.

To enable more minute classification, twelve other cloud forms have been officially added to these ten, and schemes even more detailed have been suggested.

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Clouet [*pron* KLŌŌĀ], the name of two French artists of the 16th cent., who were among the greatest of early French painters.

JEAN (or **JANET**) **CLOUET** (c. 1485–c. 1545) probably came from the Netherlands. He was working at the French Court by 1516, and became Groom of the Chamber to the King. Several portraits are attributed to him, including one of an unknown man at Hampton Court, and that of Francis I in the Louvre. A number of his drawings exist in the Bibliothèque Nationale and elsewhere. There are also several miniatures which can safely be ascribed to him. His work is remarkable for its beauty of drawing and colour, and its excellence of execution.

FRANÇOIS CLOUET (c. 1510–1572), the son of Jean, was also Groom of the Chamber and Painter-in-ordinary to the King. A number of drawings, portraits, and miniatures which are known to be his work still exist, to show his marvellous draughtsmanship and great technical ability. There is a portrait of Catherine de' Medici at Versailles, and one of Francis I in the Uffizi, another of Francis I in the Louvre, together with the portrait of Elizabeth of Austria. His remarkable chalk-drawing of Mary, Queen of Scots, is well known, and he also executed a number of beautiful miniatures.

Clough, Arthur Hugh (1819–1861), English poet, spent his early years in America and was later at Rugby and Oxford. For a time he played a part in the Oxford Movement, but later his views became more sceptical. In 1853 he obtained a post in the Education Office. His death by malaria at Florence was lamented in Matthew Arnold's *Thyrsis*. His works, the best known of which are *The Bothie of Tober-na-Vuolich* (1848) and *Ambarvalia* (1849), are perhaps more remarkable for their metrical experiments than for their beauty of diction.

Clover, also known as trefoil (*Trifolium*) from the division of the leaf into three leaflets, is a small herb of the order Leguminosæ (*qv*) characterised by the crowding of the numerous flowers into a rounded or oval cluster, and by the flowers remaining in position after the formation of the pod. Clovers are useful food-plants for cattle, either on pasture-land or as clover-hay. There are several kinds, the commonest being the white or Dutch clover, sometimes regarded as the shamrock, the red clover, which has purplish red blossoms, and the scarlet clover, known by its larger scarlet flower-clusters.

Cloves, see **SPICES AND CONDIMENTS**.

Club, an association of people with any common interest or purpose. Political clubs were common among the Greeks and Romans. Literary clubs in the modern sense may be traced to the meetings at the Mermaid Tavern in Bread Street, perhaps begun by Raleigh, and later attended by Shakespeare, Beaumont and Fletcher, Ben Jonson, and other playwrights and poets, though long before this small groups and schools of writers had met for discussion and intercourse. A few political clubs, such as the Rota and the Calves' Head, sprang up in the 17th cent., but the 18th-cent habit of attending coffee-houses emphasised the social aspect of club-life. Some of these coffee-houses were the rendezvous of Tories, others of Whigs, still others

of lawyers, litterateurs and the professions generally. From this tradition the modern club directly sprang. Among the 18th-cent clubs still existing are White's (1698), Knights of the Round Table (1709), The Cocoa Tree (1746), Boodle's (1762), Brooks's (1764), Royal Thames Yachting (1775), Royal Topham (1781), and Marylebone Cricket Club (1787). Other famous clubs are the Carlton (1832) and the Constitutional (1883), both Conservative; the Reform (1837) and the National Liberal (1894), both Liberal; St James (1857), diplomatic; the Garrick (1831), theatrical and artistic; the Travellers (1819) and the Turf (1869). The subscription of the principal London clubs varies from 5 to 17 guineas a year. In recent years there has been a decline of exclusively male club-life and an increasing provision of women's and mixed clubs, as well as a large growth of well-organised Working Men's Clubs. There are nearly 12,000 clubs in England and Wales, with a membership of 3,750,000. Of these: 847 are Trade Union, 1696 Athletic, 160 General, 1391 Ex-Servicemen, 131 Conservative, 736 Golf, 540 Liberal, 625 Masonic. All clubs must register full particulars of membership and organisation, a provision largely made to check the habit of using clubs to circumvent the licensing laws.

Club foot, deformities of the foot acquired or congenital, exhibited in various forms. The heel may be raised off the ground, the foot turned inward and shortened, or both conditions may occur together, as in the usual congenital club-foot associated with infantile paralysis. The usual cause of acquired club-foot is the condition in which the toes are raised off the ground. Congenital deformity should be treated early, the foot being manipulated into the proper position, but if this does not suffice, an operation dividing certain tendons and ligaments may be necessary, the foot being fixed in the proper position with plaster of Paris. **Flat foot**, due to over-weighting of the arch of the foot,

should be treated by standing on tip-toe and walking on the outer border of the foot.

Club Mosses, a group of epiphytic land plants with dichotomous branching of root and stem and numerous small, closely placed leaves with sporophylls resembling the vegetative leaves grouped as cones at the ends of some shoots bearing single sporangia on the upper side. The spores are all of the same size. This group of plants has affinities with the Selaginella group and the extinct Lepidodendrons which were big trees in the carboniferous period.

Cluj [KLAZSI], city (formerly Klausenberg) and department of Transylvania, Rumania. There are numerous interesting buildings, including St Michael's Church (1396) and Bathanyai palace. Cluj has a university founded in 1919 and museums. The main industries are brewing, distilling, making of textiles, sugar, soap and candles. Pop. 100,000.

Cluny, a town in the Saône-et-Loire department, France, on the R. Gironne. It is rich in mediæval architecture, specimens of which are to be found in its Benedictine abbey, the churches of Notre-Dame and St. Marcel and the old fortifications. The abbey was founded in 910 by William the Pious, and by the 14th cent. had become the head of 314 houses. Cluniac monasteries were introduced into England in the 11th cent. the first being at Barnstaple. There is a national school of arts and trades at Cluny. Pop. 4960.

Clutch, apparatus by which two rotating shafts may be connected or disconnected for the purpose of causing one to drive the other. The majority of clutches depend upon mechanical friction between solids, the simplest of the kind being the widely used cone clutch, in which the driving and driven shafts have their axes in alignment. On one is a cone, usually of cast iron or steel, immovably fixed to the shaft; on the other a conical cup lined with cork, leather, asbestos or some similar

material, capable of being slid along the shaft, which it engages through a feather key so as to fit over the cone, the pressure applied being controllable. The plate or disc clutch is suitable for larger duty, especially when the plates or discs are multiplied. A further development is the use of conical surfaces, produced by forming V-shaped grooves in the discs, this type of clutch was devised by Hele-Shaw. In some clutches of the disc type the engaging surfaces are pressed together by magnetic force. Numerous other types of clutch are known, all depending upon friction between solids.

Positive clutches are used when instantaneous development of speed without slip is necessary, these usually consist of claws or pins which can be moved on one shaft so as to cause them to engage with suitable members on the other.

Clyde, Scottish river rising in S Lanarkshire, flows first generally N. and N E, and then turns N W to its mouth in the Firth of Clyde on the W coast. The river is of great commercial importance, as there are valuable iron and coal deposits in its valley, and some of the greatest shipbuilding yards in the world are here. It is navigable up to Glasgow for the largest vessels. About $\frac{1}{3}$ of the population of Scotland lives in the Clyde valley. The falls near Lanark, which roughly mark the end of the commercial part of the river, provide electric power. Length, 105 m, drainage area, 1500 sq m.

Clyde, Sir Colin Campbell, Baron (1792-1863), Scottish soldier and Commander-in-Chief in India during the Mutiny. He first served abroad under the Duke of Wellington, gaining valuable experience in the Peninsular Wars. He fought in the Chinese War of 1842, and the Sikh War of 1848, and commanded the Highland Brigade in the Crimean War, when he again distinguished himself. He left England in 1857 to take command in India. It was he who raised the Siege of Lucknow, and finally quelled

the Mutiny, being created field-marshal, elevated to the peerage, and granted a pension of £2000. He is buried in Westminster Abbey.

Clydebank, burgh of Dumbartonshire, Scotland, situated on the Clyde 7 m N W of Glasgow. The most important industries are shipbuilding and engineering, whilst there is a large sewing-machine works at Kilbowie. Pop (1931) 47,000.

Clynes, John Robert (b. 1869), British Labour politician. Secretary to Ministry of Food (1917-18), and Food Controller, 1918. Chairman of Labour Party, 1921, Lord Privy Seal and Deputy-Leader of the Commons in the Labour Government, 1924, and Home Secretary in that of 1929-31. President of the National Union of General Workers, and an advocate of constitutional methods in Labour disputes.

Clytemnestra [KLI'TEMNE'STRŪ], Greek legendary figure, the daughter of Leda by Tyndareus, and the wife of Agamemnon of Argos. During the absence of her husband at the siege of Troy, she became the lover of his cousin Ægisthus, with whom she plotted to murder Agamemnon on his return. This was accomplished, but, after 7 years, Orestes, son of Agamemnon, with his friend Pylades, avenged his father's murder by killing Clytemnestra and her paramour. This story is the subject of tragedies by Æschylus, Euripides, and Sophocles.

Cnidus, ancient Dorian Settlement and city of Caria in Asia Minor, whose ruins still exist in a fine state of preservation. Temples, statues, and tombs have been discovered and identified. In 394 B.C. the Persian fleet defeated the Spartans off Cnidus.

Cnossus, town in Crete, celebrated for its Minoan (2100-1100 B.C.) ruins and relics. The palace and many houses have been excavated. See also **ÆGEAN CIVILISATION**.

Cnut, see **CANUTE**.

Coach, vehicle consisting of an enclosed body sprung on 4 wheels. It

developed from the mediaeval agricultural wagon and a rough type was used by the nobility in the 16th cent. In the 17th it began to be used for public passenger carrying those paying reduced fares sitting on the roof or in a basket behind. Stage coaches were introduced between London and Coventry in 1659 and mail-coaches in 1784 between London and Bristol. Routes spread all over the country and till the coming of the railway in the thirties and forties of the 19th cent coaching was the normal means of rapid passenger and mail conveyance. Nevertheless fares were expensive (15s from London to Brighton) and on certain routes there was danger from highwaymen.

The development of long-distance passenger transport by motor-car in the years following the War is in many ways comparable to the rise of coaching at the end of the 18th cent (*see* Motor Coach).

The art of driving a four wheeled vehicle drawn usually by four horses (*four-in hand*) has been practised as a sport since the stage-coach was superseded by the railway in the middle of the 19th cent. The *Four in Hand Club* was formed in 1856 and the *Coaching Club* in 1870 but the sport is now limited to a few wealthy enthusiasts.

In 1888 James Selby drove from London to Brighton (51 m) in 3 hours 56 minutes and back in 3 hours 41 minutes.

The British royal state coach built in 1761 is still used on certain ceremonial occasions as is the state coach of the Lord Mayor of London (1775).

Coaching (needlework) an embroidery stitch used chiefly in laid gold and silver work but also in silk embroidery or appliqué as a filling outline. In gold work the thread is simply laid singly on the material and sewn down at intervals with a fine thread. If a firm outline is needed many threads are used and sewn down giving a slightly raised outline.

Coahuila, N State of Mexico bordered N and NE by Texas. The climate is healthy being hot and dry and agriculture and the breeding of cattle are the chief industries. Coahuila produces cotton wheat Indian corn and sugar. It is the only coal producing State in Mexico and is also rich in copper silver and gold whilst in the S wines and brandies are manufactured. The capital town is Saltillo. Area 63 790 sq m pop (1930) 434 000.

Coal, a combustible substance composed mainly of carbon and actually in origin converted land vegetation. There are several different kinds of coal. Anthracite is homogeneous and bright. Bituminous coal has dull and bright parts. Bogheads and cannel coals are homogeneous and dull. In lignite coal the woody structure is obvious and it often grades into peat. Brown coal resembles lignite in colour but shows no woody structure. These varieties are sometimes grouped in two divisions one including the cannel coals and bogheads which are supposed to have formed in stagnant water from decomposed debris such as spore-cases blown by the wind and drifted vegetation and the other humic coals mostly formed from dead vegetation.

Cannel coals occur in local seams usually a few inches thick. They are earthy looking often contain considerable ash residue and burn with a smoky flame. They are less brittle than ordinary coal and are largely the crushed skins of spores being often called spore-coal. The view that they were formed in pools and backwaters from debris and spores blown in from the forests is supported by the absence of woody and cellulose material and the preservation of the resinous and cuticular portions by the high mineral-content local distribution and frequent preservation of fossil fish and amphibia. Bogheads differ from cannel coal in having a richer structureless matrix and smaller spore content and in the presence of

numerous small globular yellow bodies, claimed to be colonial algae (*qv*), which often form a large proportion of the rock. From this bogheads are often termed algal coals. These yellow bodies may, however, occur in cannel coal in small quantity. Doubt has been thrown on the algal origin of bogheads, partly because the uncom-pressed nature of the bodies suggests that they were formed after the consolidation of the rock, and partly because similar structures can be produced by shaking melted paraffin in an aqueous solution of gelatine and allowing it to cool.

The lumatic coals are the bituminous coals and the anthracites, which form the end of a series, starting with peat and lignite, characterised by a gradual falling off of oxygen, hydrogen, and nitrogen, and an increase in the percentage of carbon.

The ash-content of bituminous coals differs from that of the actual vegetable material, and hence may be due in part to the effects of ground water passing through. Anthracite is characterised by a high proportion of carbon compared with volatile matter.

The most valuable commercial coals are those which produce coke when heated in the absence of air. This quality depends on the development of certain chemical substances. The valuable volatile hydrocarbons are driven off and the residue is still useful for heating.

See also CARBONIFEROUS SYSTEM, LIGNITE, PEAT, FUELS.

Coal-fish, see SAITHE.

Coal Industry. Coal taken in small quantities from shallow surface workings was used from very early times in England. The discovery of a method of using coal in place of charcoal to smelt iron in the early 18th cent enormously increased the demand, and after 1785, when Watt developed the steam-engine, coal became the principal fuel for steam-raising. By 1759 the Duke of Bridgewater had such a trade between Manchester and his collieries at Worsley that he built a

canal to carry the traffic. Throughout the 19th cent Great Britain remained the world's greatest producer, largely owing to the geographical ease of exploitation, but her output was passed by the United States in 1899 and later, in certain years, by Germany. Between a quarter and a third of British coal-production is normally exported, and the trade is one of great importance. Up till the World War it enjoyed considerable prosperity, and from 1908 to 1914 exports averaged 88 million tons annually out of an average total production of 270 million tons. In the first post-war years this prosperity was renewed, but the competition of reorganised Continental mines began to tell, and the 7-months' stoppage of 1926 gave a great impetus to the coal industries of Germany, which had been intensively rationalised in 1923-5, and of Poland. From 1927 to 1929 the British export trade recovered to 67 million tons yearly, but dropped again heavily in the world depression of 1931. Normally, between 180 and 200 million tons are retained for home use, of which gas-works take 17 millions, colliery-engines 14, railways 13, electrical generators 10, blast-furnaces 8, manufacturers 70, and domestic users 40.

British coal-mining formerly employed more men than any other industry, but since 1926 improved methods of mining and decreasing trade have brought down the number considerably, probably to below that of the textile industries, 1,104,000 men were employed in 1913, 1,213,000 in 1924, and only 800,000 in 1932. Four main British coalfields supply over 80 per cent of production, and employ 80 per cent of man-power. These are the N Midlands field (30 per cent), the S Wales field (20 per cent), the N E field (20 per cent), and the Scottish field (14 per cent). S Wales and the N E field have a great part of the export trade, while the N Midlands supply domestic and manufacturing needs. The coal mined

of very different types in different parts of the country each being adapted to some specialised use. This lack of uniformity has kept the unit of control in the British mining industry comparatively small. Up till 1928 although several firms owned 20-30 pits the average was no more than two. Considerable price competition resulted in a very uneconomical organisation. Meanwhile the iron and steel combines began to encroach upon the coal industry and many pits passed into their hands. In 1928 as a result of the loss of trade following the 1928 stoppage the N Midlands fields (S Yorkshire and Derbyshire) combined under the Central Collieries Commercial Association while similar schemes were embarked on in Scotland and S Wales. This increase in the size of the unit enables the colliery owner to make metallurgical coke economically at the pithead and extract a series of very valuable chemical by-products. In many cases heavy losses on coal sales are more than compensated for by prices obtained for coke ammonia dyers benzene naphtha creosote fuel oil and other by-products. Different processes of carbonisation now being perfected promise a new lease of life to the coal industry. High temperature carbonisation (1000 C) gives metallurgical coke ammonia oils of the benzene group and a large volume of gas. Low temperature carbonisation (400-800 C) gives domestic coke tar paraffin, and light fuel oils. The latter process is being explored for the supply of a suitable motor fuel (gas). It is now realised that the burning of raw coal is not only inconvenient and unhealthy by reason of its smokiness but also extremely wasteful of valuable products.

World coal production dropped from 4370 million metric tons in 1929 (the last year before the slump) to 1068 million tons in 1931 and a further fall was registered in 1932. The leading producers were as follows:

	(Million 1913	(Metric tons 1929	1931
U.S.A.	477	551	597
U.S.S.R.	287	362	224
Germany	141	163	119
France	87	174	133

The world's coal reserves were calculated in 1913 to be (in thousand million tons) Africa 58 America 5106 Asia 1780 Europe 784 Oceania 170 total 7398. At the present rate of mining the reserves economically obtainable should suffice for 1000-2000 years. The United States now producing one third of the world's output and possessing one half of the world's reserves has a great advantage in ease of working. Coal seams are on an average much thicker and more suitable to the use of coal cutting machinery which takes out over 70 per cent of the total. This partly explains the much greater tonnage output of the American miner over the British. It greatly reduces labour costs and enables American colliery-owners to produce at low prices and under favourable conditions to invade the European market. In Germany too mechanisation has largely been applied to coal-cutting and accounts for c. 50 per cent of the coal raised. In 1923-5 a complete reorganisation of the coal industry was carried out and many schemes instituted for gas and electricity production at the pithead for long-distance distribution. About 50 per cent of the present output is brown coal or lignite which has only one-third the heating capacity of ordinary coal.

Coal mining differs from manufacture in that it entails the use of practically no raw materials labour charges constituting c. 70 per cent of the total costs. Wages must vary very closely with the sale price and this adjustment is one reason for the many disputes. Further coal mining is organised with a very large turnover on a very small capital. The percentage profit on the turnover is therefore extremely small. In 1927 the capital involved was only £180 millions while the value of the output

was about the same as that of the railways whose capital is seven times as great. A slight increase in labour charges or a failure to reduce them may quickly change profit to a substantial loss. Before the War many companies registered losses 4 years out of 6, and yet remained prosperous on the heavy profits of the other 2 years.

The cost of production varies greatly from field to field and pit to pit, and at a given price one pit may make 5s a ton loss and another 5s a ton profit. Standard wages thus produce very different results.

Great Britain still suffers technically from her pioneer exploitation of coal. Shafts sunk in the early days are now much below the most economic size, but can be enlarged only at almost prohibitive cost. Output, therefore, is limited by the size of the shaft, whatever the underground capacity of the mine. The largest English pits raise 2 million tons of coal a year, but the general average is under 100,000 tons. Double and treble shifts mean a much more economic use of machinery, and double or treble output, they are in fairly general use except in S. Wales. Except for parts of S. Yorkshire and Derbyshire, most British coal seams are under 4 ft., and are unsuitable for cutting machinery. Despite this, output per man-shift was raised from 18 cwt in 1924 to 22 cwt in 1932. The labour engaged is of two kinds, underground and surface. Underground labour (84 per cent) consists of officials (2 per cent), colliers winning coal at the face (36 per cent), repairers for engineering and structure of the mine (28 per cent), and traffic men to convey the coal from the face to the shaft (18 per cent). Carried by cage to the surface, it is then in the hands of traffic men (6 per cent), engineers and stokers (2 per cent), mechanics (3½ per cent), foremen, clerks, and weighers (1½ per cent), and sundry labourers (3 per cent), who between them constitute surface labour (16 per cent).

Coaling Stations The development

of the steamship in the middle of the 19th cent. brought the new problem of fuel replenishment. Havens have been established in sailing-ship days for repairs and the taking in of food, but now supplies of coal, when not produced at the ordinary ports of call had to be brought great distances and stored. The importance of assuring adequate supplies on all important routes, for both merchant fleets and navies, made the provision of facilities a matter of political interest. Most important mainlands were already occupied by the early 19th cent., and the chief maritime nations established themselves on small islands and harbours suitable for strategic coaling stations. To the 18th-cent. harbour of Gibraltar, Malta, Halifax, Cap Town and Bermuda, Great Britain rapidly added Aden, Penang, Hong Kong, N. Borneo, Fiji, part of New Guinea, and many Pacific islands, as well as many points in Australia and New Zealand. Coal was stored, but for long no general survey or protective precautions were carried out. In 1881 a Royal Commission issued a report on the protection of British commerce by sea, selecting defence stations, and submitting plans for their fortification. Cape Town, Singapore, Hong-Kong, and several Pacific ports were fortified, and the protection of strategic coaling-stations was made one of the tasks of the Navy. Meanwhile, Germany established herself in the Carolines and at Wei-Hai-Wei. The United States took the Philippines and Hawaii to protect her naval interests in the Pacific.

The position of coaling stations is determined by the line of trade route and the cruising range of normal vessels, and may be influenced by natural suitability, strategic importance, or convenience for transshipment. The five chief British routes are:

- (1) Suez, India, the Far East, and the Pacific,
- (2) The Pacific via Panama,
- (3) W., S., and E. Africa and the Pacific,

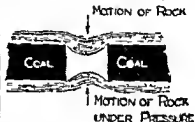
- (4) S America
(5) United States and Canada

The first being the largest and most abundant is best provided with coaling stations—Gibraltar Malta near Aden Karachi Colombo Singapore Hong Kong and Newcastle (Australia) are all in British hands. Islands in mid ocean are particularly suitable the Canaries on the African route Madeira on the United States Mediterranean route Cape Verde on the S American and the Barbados on the United States American routes are all important bunkering stations. Other most convenient sites are at the entrance of an important ship-canal as in the case of Colón at Panama and Port Said at the Suez. Coaling stations are often supplied from enormous distances and good Welsh coal may be found as far E as Singapore. The extension of oil firing with its consequent increase in cruising range has diminished the importance of coaling stations and led to the establishment of many oil fueling stations in some cases close to the sources of supply.

Coalition, an alliance of States or political parties for common action on a specific policy. Three successive international coalitions were formed against Napoleonic France in 1793 1798 and 1805 and a political coalition was formed in England for the same reason. Another political coalition was formed to defeat Irish Home Rule in 1893 and one to provide it in 1910. A Coalition Government with special powers was formed in 1916 to conduct the World War and was returned again with a sweeping majority in 1918. Normal peace conditions however ensured a return to party government in 1922 on the withdrawal of the Conservatives from the coalition. The financial crisis of 1931 brought about a coalition between the Conservatives a majority of the Liberals and a minority of the Socialists which was returned to power with a doctor's mandate as a National Government.

Coal mining When a coal field has been discovered and explored by boring the first operation is to sink a shaft. In Great Britain two shaft at least are required by law for any mine and the size of these will depend upon the rate at which it is proposed to work. This again will depend upon the amount of coal believed to be available the probable market for it and many other factors all of which must be estimated and made the basis of financial calculation. The operations of shaft sinking are described in the general article MINING.

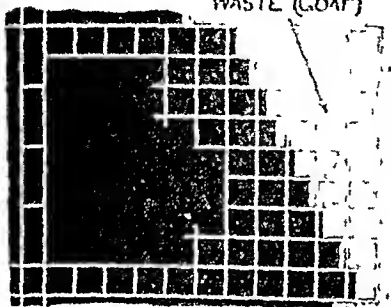
From the shaft workings are driven in a horizontal direction for distances of 1 or 2 miles. The result of completely



removing a horizontal stratum of coal underground would be to leave the earth above it without support and disaster would follow. Near the foot of the shaft therefore pillars of coal are left as supports and the levels are then driven into the seam according to a prearranged plan. At the pit bottom or eye as it is called an elaborate layout is necessary for the loading of the coal which arrives there on trucks (called *trams* *cories* *butches* or *tubs* in various mining districts) their transference to the cages in which they are elevated to the surface the stabling of the ponies generally used for haulage the pumps for keeping the mine free from water and the arrangements for ventilation. In order to work the mine it is necessary to drive roads in a horizontal direction. The arrangement of these will depend very much upon the strata and particularly upon the jointing or cleavage of the

coal. The coal yields more easily in one direction known as the main cleat or *back*, and roads are generally driven at right angles to this direction.

COAL REPLACED BY WASTE (COAR)

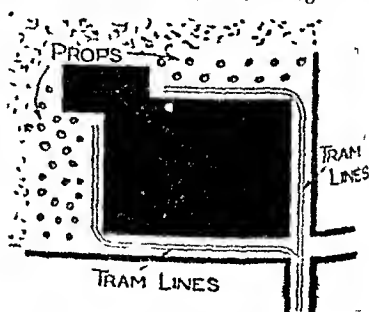


There are two main systems of working coal known as the *long wall* and the *bord and pillar* systems. In the *long wall* system the whole of the coal is extracted in one operation, the area excavated being filled up with the debris made in getting the coal. The method is suitable where a good roof and pavement exists, where the seam is not too thick or too steeply inclined, and the coal not too soft. Absence of much water is important and it is necessary that sufficient debris should be formed for proper "stowage" or filling in after removal of the coal. The advantages of this method are that c. 95 per cent of the coal is extracted, working is easier, and the "weight" or subsidence due to pressure can be taken advantage of to help in getting the coal.

The other main system of working employed is called variously *bord and pillar*, *pillar and stall*, or *sloop and room*. This is used when thick seams, exceeding 4 ft., are present, and with thinner seams when the rock is soft. It consists in first tunnelling into the seam in such a way as to divide it up like a chess-board, leaving large pillars of coal to support the working. These pillars are large in proportion to the roads which are driven, their size

increasing according to the depth of working, but running from 20 to 40 yds. square. The stalls are as wide as is consistent with safety, but the danger of this method of working lies in the possibility of "creep," that is to say, the closing-up of the stalls by subsidence of the strata. When the field has been completely worked in this way, the pillars themselves are extracted, starting of course farthest away from the pit. What is known as sand or water precking is coming into use and results in considerable economy, especially in shallow mines. Bore holes are driven from the surface into the workings, and air, refuse and sludge, or sand when available, are pumped down them to fill the space left by the removal of the pillars.

The idea of cutting coal mechanically was first mooted in the 18th cent., and in 1869 coal-cutting machines were in use in English collieries. They were driven by compressed air, but are now also operated by electricity. They may be classified in five types. What are called *heading machines* operate by rotary cutters and remove a circular core of coal c. 5 ft. in diameter. This type is not much used. *Disc machines* cut by means of a disc 3-6 ft. in diameter, armed on the edge with



Method of Removing Pillar

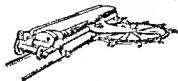
cutting points at intervals, and working in the manner of a circular saw. This type of machine is one of the commonest. *Chain machines* are a

merican invention the disc is placed by an endless chain carrying cutting tools. *Bar machines* use a tapered steel bar armed with teeth and rotated by a motor. *Percussion machines* operate on the principle of the percussion drill (see DRILL) but the drill is not rotated and works rather as a rapidly operated small pick.

Haulage of the coal underground is still mainly effected by horses though compressed air and electricity also are used. Mechanical haulage is generally accomplished by the use of single or endless chains and ropes operated by stationary engines formerly driven by steam or compressed air latterly by electricity. The use of *conveyors* (q.v.) is also widespread but they are suitable only in special instances. Where suitable shafts are driven to the west point of a mine so that gravity may aid the conveyance of the coal to the shaft.

The coal is conveyed to the surface by means of the winding engine the gear in which both miners and coal are being suspended by a long rope passing over a wheel set upon a tower at the pit head and then round a drum turned by an engine. Many safety devices are now in use which come into operation if the rope should break or be overwound. These safety devices while satisfactory at low speeds are not so when the high speeds used in modern collieries are employed. The rope may attain as much as 60 ft per second.

An important matter in most mines



Coal-cutting Machine

to get rid of the accumulation of water which nearly always takes place. Occasionally when the mine is on the side of a hill water can run

away through an adit level or nearly horizontal gallery driven for this purpose but in nearly all cases pumping is necessary. Electrically

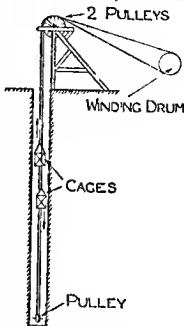


Fig. 1. Winding Machine.

driven pumps are satisfactory and are rapidly becoming universal.

The efficient ventilation of mines is vital. All kinds of agencies render the air impure apart from the gases given off by the coal. Underground fires are frequent; decaying timber emits noxious vapours. By the action of water on the various minerals such as iron pyrites oxygen may be absorbed and sulphuretted hydrogen and other gases given off. Coal itself absorbs oxygen sometimes igniting spontaneously with evolution of carbon monoxide. Finally, when explosives are used they cause poisonous pollution of the air.

sary to keep down the percentage of moisture and lower the temperature of the mine, which increases with mine depth

A mine with two shafts will have natural ventilation if the temperature, and consequently the density, of the air in the two shafts is different. The temperature increases $c 1^{\circ}\text{F}$ for every 60 ft of depth, and hence if the two shafts are different in depth, air will circulate, and the effect will be increased by the heat picked up by the air in its horizontal passage from one shaft to the other. At one time artificial ventilation was produced by the use of furnaces for heating the air in one of the shafts, but this practice has now almost disappeared, and centrifugal fans are practically the only means by which a forced draught of air is produced.

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Coal-tar an extremely important by-product obtained during the distillation of coal to make coal-gas (*qv*), or coke (*qv*)

5 per cent by weight of coal-tar. Coal-tar, produced by the distillation of coal in conditions such as prevail in gasworks (that is, at temperatures over 1000°C), contains constituents almost exclusively of an aromatic character, if, however, the tar is produced by the methods of low-temperature carbonisation lately developed, its character is considerably altered, and it then contains a considerable proportion of aliphatic products of a character similar to those found in petroleum.

Low-temperature carbonisation (*see* COAL) has, however, as yet made little headway, and the great majority of the coal-tar processed to-day has been produced by high-temperature treatment of coal.

The coal-tar obtained in the manner described above is distilled in specially constructed stills, a number of fractions are thus obtained which are a very important source of industrial chemicals.

The following table gives the principal fractions which are collected from coal-tar and the chief constituents of each.

Yield per cent (approx)	Fraction	Temperature ($^{\circ}\text{C}$)	Constituents
9	Light oil or crude naphtha	80-170	Benzene, thiophene, toluene, xylene
10	Middle or carbolic oil	170-240	Naphthalene, phenol
11	Heavy or creosote oil	240-270	Phenols, naphthalene, quinoline
10	Anthracene or green oil	270-400	Anthracene, phenanthrene, carbazole

The coal is heated in retorts to a temperature above 1000°C , and the volatile products evolved are led to a trough, where the tar and ammoniacal liquors condense, whilst the gaseous products (still containing small amounts of tar and liquor, which are removed later) pass on.

The tar that condenses in the troughs is separated from the supernatant ammoniacal liquors, and is then treated for the recovery of the various products that it contains.

An average gas coal will yield about

The residue in the still consists of $c 55-60$ per cent of pitch, which is employed in the manufacture of coal briquettes, bituminous paints, and coke.

The chief individual constituent of coal-tar is naphthalene (*qv*), which may be present in amounts up to 20 per cent.

The principal compounds from coal-tar are described under their own headings.

Coal-tar, which is a thick black liquid, is also used for a variety of purposes in

the crude state without any purificatory treatment such use is chiefly as a preservative for wood and brick work in road making, and as a fuel.

Coalville town in Leicestershire England and the coal centre of N Leicestershire Tiles and bricks are manufactured and there are also iron foundries At Whitwick (1 m outside Coalville) there are the remains of a Norman keep Pop (1931) 11886

Coarse Crusher see CRUSHING AND GRINDING

Coastal Trade sea borne trade between different ports in the same country usually carried on either by regular coastal cargo services or by small tramp-steamers Carriage by water is cheaper than by land and there is a huge coastal trade in Great Britain The tonnage of ships entering British ports in coastwise traffic is over 50 million annually of which between 20 and 25 million is in cargo

Coastguard Service A department of the Board of Customs and Excise (since 1973) for the protection of British shores Six coastal districts are each divided into 44 divisions these again being subdivided into stations the whole patrolled by a number of protective vessels The duties of the 5000 men in the service include life-saving aid to ships wrecked or in distress the prevention of smuggling and certain customs services

Coatbridge town in Lanarkshire on the Monkland Canal the centre of the chief coal and iron district in Scotland Steel rollers railway waggons tubes and fire-clay goods are manufactured Pop 43 056

Coati, or Coati Mundi a carnivorous animal of the raccoon family found in Central and S America It has a long mobile snout a long tail and feet armed with strong claws for digging and climbing Coatis often hunt in companies and feed upon lizards birds insects and other animals and on eggs

Cobalt. For the characteristics of cobalt see the article ELEMENTS

Cobalt is a metallic element sometimes though rarely found free in nature Most of the industrially important cobalt ores contain the element in combination with arsenic the principal sources are Ontario and Queensland The separation of metallic cobalt is complicated by the presence in the ores of other metals usually nickel and iron The usual method is to roast the ore so as to eliminate the arsenic and sulphur and then to fuse the residue with limestone and sand The crude cobalt oxide (*sperr*) settles out and after purification from contaminating metals by various wet chemical reactions a pure cobalt oxide is obtained which is reduced to the metal by charcoal or by heating in hydrogen

Metallic cobalt is finding an increasing number of applications in industry It is largely used for alloying with other metals to which it gives hardness and heat resistance this latter property makes it of value in the manufacture of heat resisting tools One of the most important cobalt alloys used for the latter purpose is *stellite* whose approximate composition is cobalt 65 per cent. tungsten 2½ per cent. chromium 1½ per cent and molybdenum 5 per cent This alloy also has the important property of not altering in dimensions on hardening

Cobalt Compounds The compounds of cobalt are all coloured mostly either blue or red and the majority of the applications which they find in industry and the arts are based on this fact Cobalt chloride is used in the manufacture of an invisible ink If a dilute solution is used for writing the written matter is invisible unless the paper be heated when it stands out in blue moistening the paper again causes the characters to fade

A considerable number of cobalt pigments are employed the principal of which are *smalt* a blue glass made from potassium silicate and a cobalt ore employed as a general pigment and in the ceramic industries *cobalt blue* (*Thénard's blue*) which is a pigment

formed from a compound of cobalt and aluminium oxides, is the most stable of all blue pigments, *cobalt green* and *cobalt red* are the corresponding compounds of cobalt oxide with the oxides of zinc and magnesium respectively.

Cobaltite, a naturally occurring ore of cobalt consisting of a cobalt arsenosulphide CoAsS. It is also known as *cobalt glance*. It is found in Canada, Germany, and the United States, and is used as a source of cobalt.

Cobalt Steel, see IRON AND STEEL.

Cobbett, William (1762-1835), English writer and politician, was known as a political pamphleteer both in the USA and in England. He was active in the Parliamentary reform movement, and originated Parliamentary reports. His works include *History of the Reformation* (1824), *Rural Rides* (1830), and *Advice to Young Men*.

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Cobb, see QUELSTOWN.

Cobham, Sir Alan John (b. 1894), English aviator, one of the most famous of long-distance flyers. Among his greatest feats have been flights of 12,000 m over Europe,

N. Africa and Palestine, London-Cape Town return, England-Australia



Sir Alan Cobham.

return. He was knighted in 1926, led the flying boat expedition round Africa 1927-8, was awarded the Britannia Trophy for aerial prowess 1923 and 1924 and won the King's Cup Air Race 1924. He began a campaign for the establishment of municipal aerodromes in 1927, and since then has organised "Cobham's Air Circus" to demonstrate the value of civil flying. His two films, *With Cobham to the Cape*, and *With Cobham Round Africa*, have been widely shown.

Coblenz, German manufacturing town on the Rhine at its junction with the Moselle. An important centre of the Rhenish wine trade, its other products are paper, chemicals, and musical instruments. The city was founded about the 1st cent. A.D., and among its buildings are the Elector's palace, the picture gallery, and two ancient churches. Coblenz was taken by the French in the Napoleonic Wars, later occupied by the Russians, and was one of the cities occupied by the Allied troops after the World War. Pop. 58,000.

Cobra, a deadly venomous snake (*q.v.*) found in tropical Asia and Africa, and distinguished by its "hood," a broad flap of skin on the neck, capable of being expanded by the raising of the ribs behind the head when the snake is on its defence. There are several different kinds, varying in size. The common cobra of India, often exhibited by snake-charmers, reaches a length of 6 ft., but the king cobra, or Hamadryad, of the same country, may attain 15 ft. This species feeds on other snakes, but the common cobra eats frogs, rats, mice, and eggs.

Several of the African species, notably the ringhals of the Cape, have the habit of spitting their venom into the eyes of their assailants.

Coburg, manufacturing town on the R. Itz, in N. Bavaria, interesting as having withstood a 3-year siege during the Thirty Years' War. Buildings of note are the Ehrenburg Palace (1549), the 11th-cent. castle,

which contains some Luther relics and the Edinburgh Palace (1881). There is a monument of Prince Albert erected by Queen Victoria in 1860. An important trade in cattle is done whilst iron founding and saw milling play a large part in the local industries. The chief manufactures are glass, porcelain and machinery. Pop (1901) 25,000.

Coca, a woody shrub from Peru with greenish yellow leaves which the natives chew to allay hunger. It can be grown in hothouses.

Cocaine, an alkaloid obtained from the leaves of *Erythroxylon coca*, a S. American plant. It is a crystalline white powder melting at 98°C and is laevo-rotatory. It is used as a local anæsthetic and also as a euphoric drug. Cocaine has been synthesised. See also ALKALOIDS.

Coccidia, a group of the Sporozoa (q.v.) exclusively parasitic on animals of various kinds, both vertebrate and invertebrate such as rabbits, snails, centipedes and others. They are mostly found in such organs as the liver or kidneys but are not blood parasites. Their reproduction is both sexual and asexual and they undergo a complicated series of changes in their life history but each species is restricted to a particular host. The name *Coccidium* was originally given to a species found in the rabbit and is of economic importance from the disease coccidiosis to which it gives rise. It usually affects the liver and may be at once detected by the small yellow spots which have been mistaken for tuberculosis on that organ. If well cooked a rabbit thus infected may be safely eaten.

Coccus, see BACTERIOLOGY.

Cochabamba, department of Bolivia, S. America to the E. of the Bolivian plateau. In addition to agricultural land Cochabamba possesses gold, silver and copper mines. Area 25,883 sq. m. pop. (1909) 51,739 (?). Capital of above on the R. Rocha and second city of Bolivia. Manufactures include cotton and wool

len goods and earthenware. Pop. (1909) 36,200.

Cochet [KOSHÉ] Henri (b. 1902). French lawn tennis player for several years reckoned the world's finest exponent of the game. He won the All England singles championships in 1917 and 1929 and with Brugnon won the doubles in 1916 and 1918. But he was defeated in the 1913 semi-final at Wimbledon and in the 1933 Davis Cup singles. He became a professional player in Sept. 1933.

Cochin (t) Native State of Madras, S. India between Malabar on the N. and Travancore on the S. The surface consists of forest country plains irrigated by rivers and swampy low lands which have been cultivated. The State is the main centre for the coconut-oil trade. A railway runs between the capital Ernakulam and Shoranore but communication is mainly by boat. Cotton, rice, ginger, salt and pepper are also produced. The pop. (1931) 1,000,000 consists largely of Hindus and Mohammedans though more than a quarter are Christians. Area 1,418 sq. m.

() Seaport town on the Malabar coast, Madras, formerly capital of Cochin State. First settled by the British in 1634, the town was captured by the Dutch in 1663. In 1795 Cochin was taken from the Dutch and was ceded to England in 1814. It is the second port of the Madras Presidency. There is a dry dock, an arsenal, shipbuilding yard, brick works, saw and oil mills. The chief exports are coconut products and tea. Pop. 150.

Cochin China, French colony in S.E. Asia, one of the five States of French Indo-China, bordered by Cambodia and Annam and S.E. by the China Sea. It was ceded to and annexed by France 1860-67. In the main it is a broad plain, mountainous in the N. and watered by the delta of the Mekong and Don-nai together with the Saigon and the two Vasco Rivers. The climate is unhealthy, being subject to monsoons. Tiger

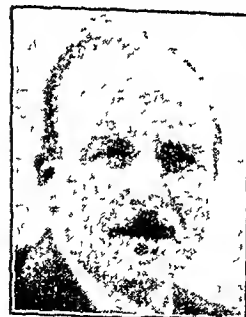
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Sir Alan Cobham

Cobh, see
QUEENSTOWN

Cobham, Sir Alan John (b. 1894), English aviator, one of the most famous of long-distance flyers. Among his greatest feats have been flights of 12,000 m over Europe, N. Africa and Palestine, London-Cape Town return, England-Australia

return. He was knighted in 1931. He led the flying boat expedition over Africa 1927-8, was awarded the Britannia Trophy for aerial prowess 1923 and 1924 and won the King Cup Air Race 1924. He began a campaign for the establishment of municipal aerodromes in 1927, and since then has organized "Cobham's Circus" to demonstrate the value of civil flying. His two films, *His Cobham to the Cape*, and *With Cobham Round Africa*, have been widely shown.

Coblenz, German manufacturing town on the Rhine at its junction with the Moselle. An important centre of the Rhenish wine trade, its other products are paper, chemicals, and musical instruments. The city was founded about the 1st cent. A.D., and among its buildings are the Elector's palace, the picture gallery, and two ancient churches. Coblenz was taken by the French in the Napoleonic War, later occupied by the Russians, and was one of the cities occupied by the Allied troops after the World War. Pop. 58,000.

Cobra, a deadly venomous snake (q.v.) found in tropical Asia and Africa and distinguished by its "hood," a broad flap of skin on the neck, capable of being expanded by the raising of the ribs behind the head when the snake is on its defence. There are several different kinds, varying in size. The common cobra of India, often exhibited by snake-charmers, reaches a length of 6 ft., but the king cobra, of Hamadryad, of the same country, may attain 15 ft. This species feeds on other snakes, but the common cobra eats frogs, rats, mice, and eggs.

Several of the African species, notably the ringhals of the Cape, have the habit of spitting their venom into the eyes of their assailants.

Coburg, manufacturing town on the R. Itz, in N. Bavaria, interesting as having withstood a 3-year siege during the Thirty Years' War. Buildings of note are the Ehrenburg Palace (1640), the 11th-cent. castle,

Bare-eyed Cockatoos A few rarer species like the Banksian Cockatoo and the Great Black Cockatoo which is found in New Guinea and distinguished by its naked cheeks are blackish in hue

Cockatrice. The, a fictitious creature having its origin probably in the fact of the hermaphroditic fowl—a crowing hen—being known to occur in nature. In legend it is said to be hatched from a cock's egg by a serpent and is an ugly creature having a crested head glittering eyes a barbed tongue and a serpentine tail. It is mentioned in the Bible more than once the most striking passage being that in Jer-



Cockatrice

miah (vii 17). It is also found as an heraldic device. The *Danish* (qv) is a form of cockatrice having a serpent's head at the end of its knotted tail.

Cockburn [pron cō BURN] Sir Alexander James Edmund (1802-1880) Lord Chief Justice of England from 1859. He took part in many celebrated cases and represented Britain on the Alabama enquiry at Geneva 1871. He presided over the second Tichborne trial 1873.

Cockburn, Alicia (c 1713-1794) Scottish poetess wrote one of the songs entitled the *Flowers of the Forest* that beginning— I've seen the smiling of Fortune beguiling

Cockburn, Sir George (1773-1853) British admiral. As captain of the *Wassar* assisted Nelson at the blockade of Leghorn 1796 and shared in the capture of Martinique 1809. In the American War he took part in the capture of Washington 1813 and in 1816 conveyed Napoleon to St Helena.

Cockchafer or *Chaffer* a common lamellicorn beetle brown in colour and about 1 in long which in its larval and adult stages is destructive to vegetation. The adult a powerful flier feeds on the foliage of various trees while the larva sometimes called the white worm which is hatched from eggs laid in the ground feeds on the roots of grasses and causes great damage in pastures and cornfields. It is a fleshy grub with the body bent upon itself and lives a browsing subterranean life for 3 years before pupating. The grubs are eaten by rooks and other birds and the beetle itself by the nightjar (qv).

Cockerell, Chas Robert (1788-1863) English architect. A.R.A. 1809. R.A. 1836. Professor of Architecture at the Royal Academy 1840-57. He was architect to the Bank of England and completed St George's Hall in Liverpool 1847. He built the University Galleries at Oxford the Fitzwilliam Museum at Cambridge (with George Bassett). He also took part in excavations in Greece which resulted in some valuable additions to the British Museum collection.

Cockermouth town in Cumberland England 6 m from Carlisle at the junction of the Derwent and Cocker Rivers. The poet Wordsworth was born here in 1770. There are the remains of a small Roman fort at Papcastle to the W of the town. There are coal mines in the vicinity as well as woollen and flax mills. Manufactures include hats thread for art needlework hosiery and paper. Pop (1931) 4789.

Cock fighting the practice of setting game-cocks to fight each other usually for the purpose of wagering money on the result is of very ancient origin.

wild boar, leopard, elephant and birds, including partridges and peacocks, abound in the forests. Phosphate of lime, lignite and

Mexico, and the females are dried and exported for the manufacture of the dye.

Cochran, Charles Blake (b 1872) English stage producer, began as a actor in America, and for several years managed various American theatrical enterprises, circuses, etc. He brought Hackenschmidt and Houdini to England, and introduced roller-skating into several continental countries. Began English theatre management in 1914, and has an interest in several London theatres. Among his many successes have been *Bitter Sweet*, *Casalcade*, Reinhardt's production of *The Miracle*, and a number of brilliant revues. He brought the *Chauvins* to London, and since he was appointed manager of the Albert Hall (1926) has introduced many noted artists. Other activities have been the Wembley Rodeo (1924), a number of boxing-matches, and circuses. Author of *Secrets of a Showman* (1925).

Cockade, kind of rosette worn in the hat by men-servants of naval and military officers, or of individuals holding office under the Crown. It was formerly worn in the hats of soldiers, as in the case of "the white cockade," the famous badge of the Jacobites.

Cockaigne, Land of, an imaginary country, a Utopia of mediæval legend, where a life of luxury and idleness was possible. Cockaigne was a gourmand's paradise, where the rivers flowed wine, the houses were made of cakes, and the streets of pastry. In some quarters it is held that the word "Cockney" is a corruption of Cockaigne—the reference being to the London of the rich, with its "streets paved with gold."

Cockatoos, are parrots found in Australia and neighbouring islands. They are mostly white or of some pale shade of colour, with an erectile crest on the crown of the head, and are noisy gregarious birds, often living together in great flocks, and doing damage to newly sown corn. The most commonly imported species are the Sulphur crested, Leadbeater's, Roseate, and



C. B. Cochran

granite are found in limited quantities. The only port and export centre is Saigon, which is 30 m from the sea. The chief product is rice, others include beans, maize, cotton, sweet potatoes, sugar-cane, and rubber. There is a silk farm at Tan-Chan, and other industries include silk-weaving, sugar-making, native jewellery, and basket-work. The chief exports are rice, pepper, dry and salted fish, and cotton, whilst textiles, machinery, and wine are imported. River and coastal fishing is carried on extensively.

The pop., which consists mainly of Annamese, was (in 1931) 4,467,300, of whom 14,900 were French. Area, 26,476 sq m.

Cochineal, a dyestuff, pink or red in colour, yielded by one of the scale-insects or "mealy bugs" of the family *Coccidae*. The insect is a native of

posed of two or more ingredients iced and thoroughly shaken in a special shaker. The ingredients should be (1) a spirit such as whisky gin rum brandy or a liqueur (2) a flavouring such as orange lemon or grapefruit juice (3) French or Italian vermouth (4) cream or white of egg (5) angostura bitters. The simplest type of cocktail is gin and Italian or French vermouth or the two vermouths mixed usually served with a preserved cherry. See *The Savoy Cocktail Book*.

Cockton, Henry (1807-1853) English comic and minor novelist author of *Valentine for the Ventriquist* (1840) and *Sylvester Sound the Somnambulist* (1814).

Cocoa, the beans of the cacao tree (*Theobroma cacao*) ground finely. Cacao is grown extensively on the Gold Coast Brazil and other tropical regions. The tree is grown from seed and in 4-5 years bears on trunk and main branches many small pink flowers from which big pods develop. The beans are scooped out of the pod fermented and dried in the sun. One tree yields only c 2 lb of beans a year. The beans are roasted and crushed to nibs angular hard brown fragments which when ground make a rich beverage with hot water and sugar. The usual cocoa however is less rich consisting of nibs from which the fat or cacao-butter has been extracted before grinding. This butter is used in confectionery and in the manufacture of toilet preparations.

Cocoa and Chocolate Manufacture. The raw materials used in these industries cacao beans and sugar are both tropical products the cacao tree being found only within 20° N and S of the Equator. Its original habitat was tropical America but it has now been planted in many parts of the world. The production of fruit is continuous throughout the year the ripe pod is red or crimson and 6-10 in long. Its shell or husk about $\frac{1}{4}$ in thick contains a soft pink pulp in which some 25-40 beans or seeds are found.

The actual composition of the beans

though chemically very complex may be separated into the fat or cacao butter the cacao matter and the shell. The butter which forms c 60-65 per cent of the bean is a complex mixture of fats (qv). It melts at c 3-34° C. The cacao matter has an extremely complex composition but the important constituent (c 14-3 per cent) is theobromine an alkali very like caffeine (see ALKALOIDS). Theobromine has much less effect on the heart than caffeine but also acts as a general stimulant.

The world's output of cacao beans is about half a million tons annually. This is produced mainly in Africa and America the Gold Coast and Brazil being the largest producers of these continents. A little cacao of very good quality is produced in Ceylon and Java.

The raw beans are cleaned and then roasted which makes easier the separation of the husk from the kernel and improves the flavour of the kernel or nib by destroying the bitter astringent matter. Roasting is usually carried out in rotating cylinders heated by gas. It is then necessary to winnow the shell from the nib and it is most important for the quality of the finished product that this should be done as completely as possible since chocolate containing shell is never perfectly smooth, and cocoa powder similarly contaminated leaves a sediment in the cup. The nib is ground between millstones the heat produced by grinding being sufficient to liquefy the butter and produce what is called *liquor mass*. The liquid which may be ground in stages flowing from mill to mill is finally allowed to set solid to a hard brown substance also called unsweetened chocolate.

The cocoa mass is next warmed and subjected to pressure in order to express the cacao butter. The cocoa powder after pressing still contains 5-30 per cent of cacao butter and since the cacao butter is worth more than the cocoa powder it is the aim of the manufacturer to press as much as pos-

probably Asiatic. It was popular among the Greeks from the 5th cent B.C., and was adopted from them by the Romans, who probably introduced it into Britain. In spite of several attempts at suppression, notably by the Puritans, it remained highly popular up to the 19th cent. Henry VIII built a Royal Cockpit at Whitehall Palace.

A *main* was usually a series of single combats between an agreed number of pairs. In a *Welsh main* 8 pairs took part, the winners being matched together in semi-finals and final. In a *battle royal* a number of birds were placed together in the cockpit and left to fight among themselves till only one remained alive. Coeks were usually equipped with a steel spur, 1 to 2½ in long. A *cockpit* was a circular space c. 20 ft in diameter, surrounded by a low barrier. Cockfighting was made illegal in England in 1849.

Cockle, small marine bivalve Mollusc (*q v*). The shells are white, convex, and ribbed, with finely toothed edges closely interlocking when the valves are closed. It lives in shallow water, burrowing and hopping about by means of its long foot. It is a common article of diet. Many closely related species are found in various parts of the world, some being of considerable size and beauty.

Cockney, a term originally applied to the inhabitants of any town, and implying their ignorance with regard to the facts of farming and agriculture. In the 17th cent its application became limited to the inhabitants of London, and this is now its general sense, though it is said to apply strictly only to those born within the sound of St Mary-le-Bow bells. The *Cockney Accent* or dialect is chiefly characterised by the following peculiarities: substitution of *f* or *v* for *th* (e.g. *brovver* for *brother*), of *ah* for *ou* (*rahnd* for *round*), and *ou* for *o* (*nou* for *no*), and a tendency to nasalise many vowels. Other characteristics, which are not, however, confined to Cockney, are *i*

for *ā* (*lidy* for *lady*), *oi* for *i* (*join* for *fine*), and the dropping or misplacement of the letter *h*.

Cockney School, a nickname given by J. G. Lockhart to the London supporters of the Lake School (*q v*), to which he intended to place the stigma of bad taste, vulgarity, extravagant pretensions, and low birth upon such men as Leigh Hunt, Hazlitt, Haydon, Keats, and Lamb. The charges were generally unjustified.

Cockroach, an insect of the order *Orthoptera*, is a familiar house-pest sometimes being erroneously called "black beetle." Cockroaches are however, not beetles, and are brown in colour. In the common species believed to have come from the E. but now introduced all over the world the male is fully winged, but the female is wingless. The eggs are enclosed in horny purse-like cases attached to the abdomen of the female and carried about until the young are ready to be liberated. The larvæ resemble the adults, but are wingless. Another alien, the American cockroach, larger, but rarer than the common kind, has both sexes winged. A third, very much smaller, species, the German cockroach, which is not uncommon in some restaurants, also has wings in both sexes, and has the power, not possessed by the others, of climbing up smooth surfaces like window-panes. A few harmless species, living under stones or logs, are native to England. Cockroaches can sometimes be caught in numbers by putting on the floor at night a soup-plate containing a mixture of beer and treacle, with pieces of firewood sloping from its edge to enable access. The places they haunt may also be smeared with a mixture of borax and turpentine.

Cock's-comb, a tender annual with large, strongly-coloured bractea flowers, on dwarf leafy plants. Seed best sown in March, in pans placed on a newly made hot-bed, the seedlings being gradually hardened and bedded out or kept in a cool greenhouse.

Cocktail, an alcoholic drink con-

a friend of Picasso and Milhaud. His ballet *Les Femmes d'Alger* and his novels including *Thomas l'Imposteur* and his critical studies of which *Le Coq et l'Arlequin* is an example are well known, and have influenced many modern writers.

Cod, a familiar and valuable marine food fish related to the haddock and whiting and found principally in the N. Atlantic the chief fishing grounds being the North Sea, and off the coast of Newfoundland. It takes from 3 to 4 years to reach maturity its average



Cod

length being c 3 ft. Many thou and tons are landed annually in Great Britain and the oil extracted from its liver is well known for its nutritive properties while the air bladder is one of the sources of isinglass.

Code, a system of laws. The first full and systematic code was that of the Emperor Justinian. Since then the most famous have been the Code Napoleon and the German Code. The English legal system is being gradually codified in all its branches e.g. Bankruptcy Bills of Exchange Sale of Goods Property etc. The advantage of a code is that it enables a logical and certain system of law to be established. Its main defect is its rigidity in the face of rapidly changing circumstances.

Code Civil, the first code of the French civil law established under Napoleon and known until 1804 as the *Code Napoléon*. It has served as a model for many subsequent codes e.g. the Dutch Italian Belgian Codes etc. See also LAW.

Codeine [from KODIEN] one of the

opium, family of alkaloids a white crystalline substance with a melting point of 153 C. It is employed in medicine as a sedative especially against coughing and other irritations of the respiratory passages. See also ALKALOIDS.

Cods Napoleon, see CODE CIVIL, NAPOLEON I.

Codell, see WILL.

Codlin Moth, a pretty little moth which in its larval stage is very destructive to apples devouring principally the pipe and causing the condition known as worm-eaten. When full-sized the grub eats its way through the rind and pupates in a crevice of the tree.

Cod Liver Oil, a fatty oil obtained from the livers of cods by heating them in water with steam. The oil is used exclusively for medicinal purposes as a convenient source of vitamins A and D. The chief centres of production of the oil are Norway and Newfoundland. In commercial oil the liver oils of other ground fishes such as the coal fish are often included such oils are quite equal in medicinal value to true cod liver oil.

The codium salts of the mixed fatty acids of cod liver oil are used in medicine for various purposes under the name of *sodium morrhuate*. Cod oil is an inferior oil obtained from decomposed or otherwise defective livers. It is not used for medicinal purposes but finds an outlet in the leather industry. See also OILS, FATS AND WAXES.

Codrington, Sir Edward (1770-1851) British admiral commanded the Orion at Trafalgar and served in the war with America 1814. As commander of the Allied Mediterranean fleet 1821 he defeated the Turkish and Egyptian Navies at Navarino and secured the evacuation of the Morea 1823.

Cody Samuel Franklin (1861-1913) American aviator. Came to England 1903 and invented a successful biplane 1909. Was aeronautical adviser to War Office and won its aeroplane competition 1912. Killed in an air crash near Aldershot.

sible out of it After extraction of the butter, the *press-cake* has to be ground exceedingly fine the finer the powder, the more agreeable is both the cocoa and the chocolate made from it After grinding, in order to remove all coarse particles, the material is sifted through silk bolting with holes $c \frac{1}{16}$ in diameter, the coarse material being returned for re-grinding The resulting fine powder is sold as cocoa

Chocolate consists essentially of a mixture of sugar and cacao, but for very high-class chocolate the greatest care has to be taken with the selection and treatment and blending of the beans used For making chocolate more cacao butter is left in the mass, and this is ground to the highest degree of fineness obtainable, upon this the final quality very largely depends The sugar, which itself is ground exceedingly fine, is then mixed with the mass in a special mixer (a *mélangeur*), and grinding is continued, this process being known as "refining"

Conching follows, the effect of which is greatly to improve the flavour and consistency of the chocolate, for reasons which are not understood It consists in pushing a mass of chocolate to and fro in a tank surrounded by a water bath, the temperature of which is adjusted to suit the particular type of chocolate being made

CONSULT H W Bywaters, *Modern Methods of Cocoa and Chocolate Manufacture* (London 1930)

Coconut Crab, a large land Crustacean (*q v*), 2 ft or more in length, and massive in proportion It is related to the Hermit-Crab (*q v*), and is found in many of the Indo-Pacific islands It lives in holes at the roots of palm trees and feeds upon fallen coconuts, fruit, carrion, and its injured companions With its powerful claws it tears off the husk of the coconut and hammers at the "eyes" until a hole is made It then either extracts the fruit direct, or smashes the shell by beating it on the ground It is a good climber, and may often be seen at a great height looking for fruit It is uncertain whether the

young are hatched in the burrows of land, or whether the eggs are laid in the sea.

Coconut Oil, a fatty oil obtained from copra (*q v*), the dried flesh of the coconut The oil is used for food purposes such as the manufacture of margarine and for soap-making It is used especially for marine soaps, i.e. soaps that will give a lather with sea-water See also OILS, FATS, AND WAXES This oil is still often described as cocoa-nut oil This spelling is incorrect, and leads to confusion of the oil with cacao butter

Coconut Palm, a large palm, 100 ft high when fully grown, with a cylindrical stem scarred with the marks of former leaves, bearing a crown of some 20 giant leaves with long leaflets The flowers are borne 3-5 together in a racemose inflorescence, and a number of inflorescences are produced Each tree yields c 100 nuts a year The tree bears fruit c six years after planting, and lives for 70-80 years The coconut is a staple food of the inhabitants of many tropical islands, being eaten raw or cooked Coconut oil (*q v*) is extracted from the kernel The root of the tree is chewed for its narcotic properties Toddy and palm wine are obtained from the sweet sap of the inflorescences The leaves are used for thatching, and plaited into baskets, mats, and screens

Cocoon, the name for the silken case enveloping the chrysalis of several Lepidoptera, especially the silk moths

The term is also applied to the silk sack in which spiders enwrap their eggs See also BUTTERFLIES AND MOTHS

Cocos (or Keeling) Islands, a group in the Indian Ocean, nearly 1200 m. from Singapore, part of the Straits Settlements, to which they were annexed in 1903, they are administered from Singapore The chief native products are copra and coconuts Here the German cruiser *Emden* surrendered, 9 Nov 1914 Pop (1931) 1150

Cocteau, Jean (b 1892), French poet and novelist, an experimenter in modern literary and artistic forms and

budding may give rise to colonies in which the individuals are either all alike or differ some being nutritive, some reproductive. The fixed colonial and some of the solitary forms develop horny or calcareous skeleton for protection and support.

Coelostat *see* OBSERVATORIES

Coemption (Roman law) a form of civil marriage by a fictitious sale of the two parties to each other.

Coercion (law) moral or physical pressure employed to force a person to do some act. In civil law where an act is required to be done freely e.g. contract marriage etc. it will be invalidated by the element of coercion. In criminal law direct physical compulsion may sometimes excuse a crime. Formerly a wife committing a crime was presumed to be acting under the coercion of her husband but this ground of defence is now available only if the husband is actually present at the crime.

Coercive force *see* MAGNETISM

Coffee The plant is an ever green shrub 18- 0 ft high with egg shaped leaves tapering to a point hairless and with shiny surface. Flowers white in axillary clusters with 5 sepals corolla of 5 joined petals 3 stamens and 2 stigmas. The flowers are beautiful and sweet scented. The fruit is a dark red cherry like berry which contains two seeds in a mass of

come originally from Abyssinia. The genus contains about 25 species of which *Coffea arabica* is the most important though the others are grown in restricted areas for climatic or other reasons.

Coffee is grown from seed and the plants flower when 3 years old producing several lots of blossom each year. The fruits take months to ripen. They are picked, dried in the sun and the beans and dried pulp separated or in Brazil the bean and pulp are separated by machinery in a stream of water and the bean is then dried. The beans are roasted and ground just before use since the flavour depends on the amount of caffeine present which increases during storage and roasting. The ground berries soon lose their flavour. The caffeine contained in the bean is an alkaloid which is found in tea and is similar to theobromine the active principle in cocoa. Caffeine has a stimulating effect increasing the pulse-rate and affecting the nervous system.

There are several ways of making the beverage (the berries should be freshly roasted and freshly ground). It can simply be infused in a saucepan or in a jug standing in a saucepan. It can be filtered with or without filter paper in a special pot or it can be percolated the boiling water being continuously forced up a central tube and allowed to trickle through the coffee grains.

The simplest method is as follows:

1 Place 1 tablespoonful of coffee in jug and stand in boiling water in saucepan.

- Add $\frac{1}{2}$ pint of boiling water.

3 Stir and leave for 5 minutes keeping water just at the boil.

4 Infuse for 15 minutes.

5 Pour coffee off grounds.

Coffee-houses became in the middle of the 17th cent. a sort of social club and literary centre in England after the popularisation of coffee as a beverage. The first English coffee-house was opened in 1653 in St Michael's Alley, Cornhill and was



Coffee-flower

yellowish flesh. The seeds are bluish in colour hard and rough to the touch. The plant (*Coffea arabica*) belongs to the family Rubiaceae and

Coining In all States the coining of money is the prerogative of the State and counterfeiting the current coinage is a severely punishable crime. In England it is a felony to counterfeit coin to treat coins or metals so as to make them pass for gold or silver coin to clip or possess clippings of coins to make mend have or sell tools for coining to import or export counterfeit coin etc.

Coke the residue mainly amorphous carbon left on heating bituminous coal and thus driving off its volatile constituents (gas tar etc.) or on heating hydrocarbons to a point at which they decompose with deposition of carbon—the process known as cracking when applied to petroleum (q.v.) *Soft coke* is a product of low temperature carbonisation gas coke of carbonisation at the middle temperatures used for making illuminating gas (see GAS MANUFACTURE) while *metallurgical coke* is the product of carbonisation at high temperature and is used chiefly for smelting iron in the blast furnace (see IRON AND STEEL).

Coal was originally converted into coke for metallurgical purposes by a means very similar to that for making charcoal from wood but this was developed towards the end of the 18th cent. into what is called the *bee hive oven* which until recently was the chief apparatus used in making metallurgical coke. The beehive oven is now rapidly giving way to other forms of coke oven although the coke it produces is of better quality for metallurgical and foundry work than any other owing to the prolonged heating at a high temperature. In the *horizontal by product oven* the coal is carbonised in gas heated ovens. The coal is contained in retorts and the gas evolved on heating is first cooled and scrubbed to remove tar ammonia etc. and then used in part for heating the oven the excess of gas produced being diverted to other uses. Heat is not consumed by regeneration or reoperation (see FURNACE). The ovens are enormous. The charge when

coking is complete is forced from the retorts by hydraulic rams and quenched with water. Vertical coke ovens are now also made. Only the large coke can be employed for blast furnace work but the breeze as it is called makes good briquettes by binding with pitch or tar.

Coal (q.v. see also FUELS) arises greatly and coke can be made only from certain bituminous coals which on being heated and so cake together. Non-caking coals which include lignite and anthracite do not form coherent coke when heated but coke can be made from non-caking coals by grinding them fine and mixing them with a finely ground caking coal or even pitch or coal tar. Efforts are being made to develop the process of pulverising blending and briquetting coal for gas making a further advantage being that the pulverised coal can be first purified from ashy constituents and the quality of the resultant coke improved.

See John Armstrong *Carbonisation Technology and Engineering* (London 1909).

Coke Sir Edward (1552-1634) English judge who is known as the greatest common lawyer of all time. B.P. 1589 and Attorney-General 1594 he conducted the Raleigh trial 1603 and the Gunpowder Plot trial 1605. Appointed Chief Justice 1606 Coke upheld the common law against the Crown the Church and the Admiralty. Bacon now Attorney-General and abettor of James I. brought various charges against him in 1616 and Coke was dismissed. Re-elected to Parliament 1620 he was imprisoned for taking part in the Liberties of Parliament debate his Bill ultimately forming the Petition of Right 1628. In his *Reports* Coke brought order out of the chaos of contemporary common law.

Colbert, Jean Baptiste (1619-1683) French statesman who after the death of Mazarin became the chief power in Louis XIV's administration. As Controller-General he reformed finance

rebuilt after the Great Fire as *Dolly's Chop House*, where many of the most prominent men of the 18th cent used to meet. Many of the famous coffee-houses of the 18th cent were named after their original proprietors, such as *White's*, *Arthur's*, *Boodle's*, and *Milk's*.

Coffee Mill, see CRUSHING AND GRINDING

Cognac, see LIQUORS

Cognates, in Roman law persons related through male or female antecedents (see AGNATES). In English and Scots law, persons related on the mother's side only.

Cohan, Geo Michael (b 1878), American dramatist, actor and producer, is well known for his *Get Rich Quick Wallingford* (1910), *Broadway Jones* (1912), *Seven Keys to Baldpate* (1913), *The Song and Dance Man* (1923), and *Baby Cyclone*, and as the author of the War song, *Over There*.

Cohn, Ferdinand Julius (1828-1898), German-Jewish botanist, the founder of bacteriology. His important works were treatises describing his researches into the development of the minute organisms, his books on the algae on parasitism, on fungi, and on the formation of spores have not been surpassed. He founded the *Beiträge zur Biologie* (1870-1) and contributed to it articles on microscopic analysis of drinking water and bacterial epidemics and diseases.

Cohort, a division of the Roman infantry, consisting of 600 men, 10 cohorts formed a legion.

Coimbatore, district and town, British India, in the Madras Presidency. The district, which has an area of 7840 sq m, is flat, with mountains on the N W and South. On the E it opens on to the plain of the Carnatic. It is well irrigated and fertile, rice, cotton, oilseeds, sugar, and tobacco being the chief crops. Besides the rivers (Canvery, Bhavani, Noyil, and Amravati) there are a number of canals. The chief towns are Coimbatore, Erode, and Carroor. Pop 2,220,000. The town (pop 65,000), which is on

the river Noyil, manufactures sugar, coffee, and saltpetre, whilst cotton weaving and spinning are carried on extensively. There are a number of colleges, training and industrial schools. The Temple of Perur (c. 18th cent) lies 3 m from the town.

Coimbra: (1) District of Beira Portugal, area, 1500 sq m. Cattle are raised extensively, and the chief products are wine and millet. Pop. (1930) 387,800. (2) City and capital of Coimbra district, on the N bank of the R Mondego. It is beautifully situated on a hill above the river, and is famous for its university. Coimbra has an episcopal see, and there are two cathedrals. The old building is a fine specimen of 12th-cent architecture, whilst the new was founded in the 16th cent. Until 1260, Coimbra was the capital of Portugal. Pop (1922) 20,800.

Coin, a stamped metal token used as currency, named from the wedge-shaped die (Lat *currus*, a wedge) originally used in its manufacture. The oldest-known coins are the silver ones of Ægina, those of Lydia, and the gold and silver Dorians used in the 5th cent B.C. in Persia. Before these, however, bar-metal was probably used as a unit of exchange by weight, and indications of this system still exist in the English pound (of silver). Coins have usually been made in circular form from the earliest times, partly for convenience and partly to prevent clipping. The head or figure of a ruler or some symbol of the State has nearly always figured upon them together with some brief inscription indicative of their origin, and in later times of their value. Milling was also introduced to preserve them from deliberate mutilation. To-day, coins are issued by the State, and are either standard, i.e. the face and metal values are the same; or token. Up till the World War, both types were commonly in circulation together in most countries, but in recent years the former have been almost entirely replaced by notes. See NUMISMATICS.

ernite It chiefly occurs in the United States especially in California

Colenso, John Wm (1814-1883) Bishop of Natal from 1853 to 1883 stirred up a hornet's nest by publishing controversial works on the Pentateuch He denied the doctrine of eternal punishment and turned a blind eye to polygamy among his native converts The S African bishops deposed him in 1863 but he appealed to the Privy Council which upheld his position The contributions by missionary societies to his stipend were however withdrawn

Colenso a village in Natal S Africa on R Tugela the scene of a battle in the 2nd Boer War (q.v.) On Dec 15 1899 the British under General Buller attempted and failed to cross the Tugela the Boer force defeated them with practically no losses to themselves

Coleoptera, see BEETLES

Coleraine port of Londonderry N Ireland on the R Ness Important for its linen manufactures In the early 17th cent it was the centre of the New Plantation of Ulster Pop c 8000

Coleridge, Hartley (1796-1849) English poet son of Samuel Taylor Coleridge He is best known for his sonnets and editorial work his collected poems appeared in 1851

Coleridge, Sir John Duke 1st Baron (1800-1894) Lord Chief Justice of England 1880 He was a distinguished scholar orator and barrister his most famous case being the Tichborne trial 1871 His speech for the defence lasted 73 days

Coleridge, Samuel Taylor (1771-1834) English poet essayist and philosopher The *Lyrical Ballads* a collaboration between Coleridge and Wordsworth was published in 1798 and was the herald of the romantic revival in English literature Coleridge's contributions included *The Ancient Mariner* and *The Nightingale* By this time he had also written *Andreas Chrysothel* part of *Osorio* and most of his best verse From then he

travelled in Germany England and Malta lecturing and preaching but in 1801 he began to take opium He became overwhelmed by debt and depression By 1818 his success as a lecturer especially on Shakespeare became more assured and he had found a haven in the home of a Dr Gillman at Highgate where he lived until his death

He was best known to his contemporaries for his brilliant conversation such diverse minds as Dorothy Wordsworth Hazlitt and Carlyle pay tribute to it But his fame rests on his poem of a magical romantic beauty that remains unequalled and on his *Biographia Literaria* (1817) in which his critical powers are seen at their best Coleridge is universally admitted to be one of the greatest of English critics

Coleridge Taylor, Samuel (1875-1912) composer whose father was a native of Sierra Leone but whose mother was English His first work of note was a symphony which was publicly performed in 1896 but his first big success was with *Hiawatha* (1898) a cantata on the Longfellow poem which made an instant appeal and is still popular Coleridge Taylor's music is unpretentious but attractively melodious and colourful He never repeated his *Hiawatha* success but many of his lighter orchestral pieces have a distinct charm

Colet, John (c 1466-1519) Dean of St Paul's and re-founder of St Paul's School London (1509) was a friend of Savonarola Erasmus and Sir Thomas More He held liberal opinions which foreshadowed those of the Reformation

Colette (Madame de Jouvenal) famous French novelist The first translations of her work were very favourably received in England largely owing to the tributes of Arnold Bennett Later works have firmly established her reputation She began as a variety actress with her first husband the late Henri Gauthier Villars she produced the *Claudine* novels Most notable works include *Mitou* *Chéri* *Rendez-Vous*

Coleus. The numerous hybrid varieties of this genus (family Labiatae) are among the most beautiful of foliage plants. The plants are herbaceous, producing opposite leaves in alternating pairs. The leaves are pale green, with blotches or marginal lines of deep borders within, but parallel to, the margin, of dark red, purple, violet, or bright red tissue.

Colic, a term used to describe an attack of sharp pain in the abdomen. The onset of colic is usually sudden, and attended by a feeling of nausea or by actual vomiting. Despite this fact, however, the colic is not necessarily of intestinal origin. It may arise from the presence of gallstones in the bile duct, or from renal stones either in the kidney or in the tube known as the ureter, which leads from the kidney to the bladder. In gallstone colic, the pain usually radiates up to the region of the back between the shoulder blades, and is accompanied by a jaundiced discoloration of the skin, the stools taking on a paler colour than normal. In renal colic, the pain radiates downwards from the loin of the affected side to the groin. During the attack, the passage of water usually takes place at frequent intervals, and there may be gravel present in the water passed.

In intestinal colic, the pain is sited over the umbilicus and it is usually relieved by pressure or by the application of warmth. It is due to distension or spasmodic contraction of the bowel and is accompanied by diarrhoea. An oz of castor oil, followed in the morning by a saline purge, often produces relief.

Coligny, Gaspard de Chatillon, Comte (1519-1572), French soldier and Protestant leader, was killed in the massacre of St Bartholemew.

Colitis, Mucous, *see* ENTERITIS

Collateral (Lat "at the side"), used in law in various connections, a collateral security is a security given in addition to some already existing security, kindred descended from the same common ancestor as the lineal

relation, but not one from the other, e.g. the children of two brothers, are so called.

Collect, a short prayer used in certain parts of the services of the Anglican and Roman Catholic Churches, particularly at Morning and Evening Prayer and Holy Communion (the Divine Office and Mass). It is probably so called because it summarises or "collects" the previous prayers of the congregation. The English Prayer Book collects are nearly all translations by Cranmer (qv) of prayers from the pre-Reformation Missal—a notable exception, and example of Cranmer's original work being that for the Second Sunday in Advent.

Collectivism. A social system in which capital, natural resources, productive plant, and all the means of wealth are held by the community. The word was first used by the anarchist, Bakunin (1814-1876), to differentiate his policy from that of Karl Marx, but in later years collectivism was adopted by a large section of Continental Socialists, especially under the leadership of Jean Jaurès (qv). The programme of Collectivism is barely distinguishable from that of SOCIALISM (qv).

College, a body of persons associated together, the word is most usually applied to educational institutions. There is also a college of cardinals who elect the Pope from among their number, and in the U.S.A., an electoral college is formed in the Presidential election, the popular ballot being cast, not directly for the candidate, but for members of this college, who cast the final vote.

Collie, a breed of sheepdogs used for many centuries in Scotland, and evidently little altered from the primitive type, as shown by their likeness to the Australian dingo, from which they differ principally in the typically longer coat, although a smooth-coated variety is known. Collies are sometimes also used for herding cattle.

Collier, Jeremy (1650-1726), English

controversial writer was a consistent opponent of the Revolution and as such was outlawed. His works include essays and pamphlets on many subjects. *An Ecclesiastical History of Great Britain* (1708-14) and best known perhaps of all *A Short View of the Immorality and Profaneness of the English Stage* (1699). This latter called forth many replies from play wrights and actors among them Congreve and Cibber.

Collier Hon. John (b 1850) English painter son of the 1st Lord Monkswell studied at the Slade School Paris and Munich and has exhibited at the Royal Academy since 1877. *A Glass of Wine with Cesa's Borgia* (1893) is a typical example of his paintings which appeal especially through the dramatic interest of the subject matter. Another famous example of these so-called problem pictures is *Sentence of Death*. His portraits however show him at his best.

Collier John Payne (1780-1883) English literary critic who in 1852-3 published certain notes and emendations to the text of Shakespeare which were shortly afterwards proved to be modern forgeries. Later investigation proved practically beyond question that these forgeries were Collier's own. Although he did some valuable genuine work as editor and annotator nearly all his output is suspect in some degree of deliberate falsification. Among his publications were *Memories of Edward Alleyn* (1841) *The Diary of P. Henslowe* (1845) *An Old Man's Diary* (1871-2).

Collings, Rt. Hon. Jesse (1831-1909) English politician. As advocate for land reform he moved the three acres and a cow amendment which caused the resignation of the Salisbury administration in 1886. He was closely connected with Joseph Chamberlain (q.v.) in Birmingham municipal and in national politics. Founder of the Rural Labourers League.

Collingwood Cuthbert, Baron (1750-1810) British admiral. His ship the *Royal Sovereign* led the fleet to battle

at Trafalgar and on Nelson's death he assumed command.

Collins, Sir Godfrey (b 1875) the managing director of the well known publishing house Liberal M.P. since 1910 Secretary of State for Scotland 1912. He entered the Navy in 1888 and rejoined it at the outbreak of War. Was made Junior Lord of the Treasury 1919 and was Liberal Chief Whip 194-6. H.B.C. 1919.

Collins John Churton (1848-1908) English literary critic. His *Essays in Poetry and Criticism* were published in 1905.

Collins, Michael (1830-192) Irish politician. Took part in the Easter rising Dublin 1916 and was imprisoned but released the following year. Elected Sinn Féin member for Cork 1918 he took over control of the Republican Government while De Valera and Griffith were in gaol. Contrived De Valera's escape 1919. £10,000 reward was offered for his arrest 1920. In 1921 he persuaded the Dail to accept the treaty with Great Britain against De Valera's opposition and became chairman of the provisional Government under Griffith. On the latter's sudden death on Aug. 12 1920 Collins became head of the State but was ambushed and shot ten days later.

Collins William (1721-1759) English poet is best known for his *Ode on the Passions To Learning and How sleep the Brave*. His lyrics in their purity and sincerity were unaffected by the prevailing tendencies of his time and foreshadowed the romantic revival of the early 19th cent.

Collins Wm Wilkie (1824-1889) English novelist. His better known novels *The Dead Secret* (1857) *The Woman in White* (1860) and *The Moonstone* (1868) appeared as serials in Dickens's journal *All the Year Round*. *The Woman in White* contains one of the most famous villains in English literature—Count Fosco and *The Moonstone* has the reputation of being one of the best detective stories in the language.

Collision at Sea, the running foul of one ship against another. The navigation of ships is now governed by rules made under the Brussels Convention, 1910, which unified the more important rules that had until then been applied. Contrary to the rule applicable to damage resulting from an ordinary tort (*q v*) committed on land, damage done at sea is apportioned between the ships according to their respective degrees of fault.

Collodion, a solution of nitro-cellulose in a mixture of alcohol and ether. The lower (tri- and tetra-) nitrates of cellulose are those in use. Collodion is a thick and very inflammable liquid, it is employed to a considerable extent in the manufacture of artificial silk (*q v*) by the Chardonnet process, and in photography. On drying, collodion leaves a thin, transparent, and tenacious film, and is employed in surgery to paint over minor wounds. If applied to the end of the urethra it is said to cure nocturnal incontinence of urine.

Collodion is also employed in the manufacture of artificial leather and some grades of artificial pearls.

Colloid Chemistry. Everyone is familiar with the way in which a crystalline substance, such as common salt, dissolves, say in water. The solution is perfectly transparent, and no filter, however fine, will remove the salt. If a solution of salt and water is placed in a vessel made of parchment paper, and this is immersed in pure water, the salt rapidly diffuses through the parchment into the water. We explain this by assuming that the particles of salt are broken up by the water into molecules comparable in size with the water-molecules themselves, and are thus dispersed evenly through the water in this fine state of division. They can then pass through the parchment as freely as can the water. If on the other hand we have a solution of gum in water, which is also quite transparent, the gum will not be diffused through parchment. If we have a mixture of salt and gum dissolved in water, the salt can be

separated from the gum by putting the mixture in a parchment vessel, and standing this in an outer vessel through which pure water is circulated. This process is known as *dialysis* (See Fig 1, p 90).

These fundamental facts were discovered by Thomas Graham in the year 1861. He called these substances which, like gum, form transparent solutions but do not diffuse through membranes, "colloids," from the Greek word *κόλλα*, meaning glue. Substances like salt he called *crystalloids*, for it was then believed that colloids could not be crystalline. Another class of colloidal solutions was found when Faraday, in 1857, was able to prepare transparent liquids which undoubtedly consisted of metallic gold dispersed through water in so fine a state of division as to be invisible under the most powerful microscope. It was found that sulphur, Prussian blue, and many other such substances, completely insoluble in the ordinary sense, could nevertheless be dispersed through water in this way. It was found that in this case also diffusion took place with extreme slowness, and it was thus assumed that the particles of gold, sulphur, etc., while too small to be seen by the microscope, were much larger than the molecules of dissolved crystalloids. Solutions of this kind, unlike those of substances similar to gum, were found to be very sensitive to small quantities of crystalloids dissolved in the water. A very small amount of acid or alkali would cause them to coagulate, that is to say, the particles would join together into visible "flocks," which would then appear as a precipitate in the liquid.

The general term for such formations, in which one body exists in a state of extremely fine, but not molecular, division throughout another body, is "disperse system," the substance dispersed being called the "disperse phase" and the other substance being called the "disperse medium."

Emulsions and suspensions are

called sols when the dispersed substance is invisible through the microscope certain liquid sols when very concentrated become solid or semi solid and then are called gels. The ordinary gelatine jelly is an instance of this.

While the particles of sols are too small even to be seen in the microscope Siedentopf and Zsigmondy by their invention of the ultra microscope enabled them to be counted. The principle of this is easily understood by looking at a ray of sunlight passing through ordinary dusty air. The particles of dust are too small to be seen by the eye but they catch the light in other words scatter it and we see them as shining particles. If a strong parallel beam of light is passed through a sol which appears to us perfectly transparent we see a shimmer of light along the path of the beam which is not present with pure water or a solution of crystalloids. The eye cannot detect individual particles in the shimmer but a microscope can. They appear as brilliant stars against a dark ground in rapid irregular motion (Brownian motion see Kinetic Theory). Sols are generally coloured they scatter light complementarily in colour to that which they transmit. Hence the blueness of the sky ($g \nu$) and the redness of the setting sun.

The following scheme due to Zsigmondy shows us more or less completely the range of phenomena covered by colloid chemistry. The unit $\mu = 0.001$ millimetre $\mu\mu =$ one millionth of a millimetre.

0.1 μ	1 μ	10 μ	100 μ	1m	10 μ	100 μ	1mm
Ultra-microscopic region				Microscopic region			
Particles show Brownian movement				No visible Brownian movement			
Particles pass through ordinary filter paper				Particles retained by filter paper			
Particles show in mixed sol stability				Particulate ordinary solubility			
True solution		Colloidal solutions		Emulsions and suspensions			
0.1 μ	1 μ	10 μ	100 μ	1m	10 μ	100 μ	1mm

The characteristic of all these different varieties of sol is the fact that the constituents from many technical liquids such as petrol and sugar juice

face of separation between one substance and the other is enormous in extent and the study of colloid chemistry begins with a study of the physical and chemical properties of this interface as it is called. In the article SURFACE TENSION it is shown that any such surface of separation as that between a liquid and a gas is characterized by a force like that of a stretched membrane tending to reduce the surface hence a drop of oil suspended in water of the same density takes the form of a perfect sphere which has the minimum possible surface the same is true of a raindrop. For this reason also oil shaken up with water until it is in a very fine state of division runs together again when left to stand.

If a gas in contact with a liquid or a solid or a liquid in contact with another liquid or solid contains a component which is concentrated at the surface between them reduces the surface tension such concentration will happen of itself this phenomenon is called adsorption and is of enormous practical importance though the layer of a substance thus adsorbed on a surface is only 1 or 2 molecules thick. Vegetable charcoal such as that made from coconut shells consists of a solid foam and has an enormous internal surface. It condenses on this surface many of the poisonous gases such as phosgene (used as poison gas in modern warfare) and hence is employed in the construction of gas-masks the wearer breathing air which has passed over such coconut charcoal. It is also used to remove undesirable

We may thus look upon all gels as a kind of sponge or network resulting from the linking up of colloidal particles. In the wet liquid gel, the pores are so small as to be quite invisible in the microscope, but when the mass is dried they probably become somewhat coarser.

Adsorption is of great importance in the case of the sols of such substances as gold, which have no tendency to combine with water (lyophobic sols). The particles of these sols behave as if they were electrically charged, and when an electric voltage is applied between a pair of electrodes immersed in such a sol, the particles move towards one or other of the electrodes. This phenomenon is called cataphoresis. This charge on the particles is regarded as formed by the selective adsorption of either positive or negative ions, and hence such sols are extremely sensitive to the presence of electrolytes, and for any sol there is an optimum amount of electrolyte which renders it most stable. The same is true of emulsions, and this has an important technical application in the case of the natural emulsion of rubber in the tree sap, called *latex*. The addition of a small amount of ammonia renders this emulsion sufficiently stable for it to be transported to Europe from the tropics. Sols of substances with an affinity for water (lyophilic sols) are much less sensitive to coagulation. These substances are often readily adsorbed on to the particles of lyophobic substances, and render sols of the latter much more stable. This fact is also made use of, for instance in the preparation of technical emulsions, such as petroleum emulsion, emulsion of cod-liver oil, and also margarine, which is a very highly concentrated emulsion of animal fats. In all these cases albumin, generally in the form of milk, is utilised. Milk itself is an emulsion of fat particles protected by the albumin, which is itself present in excess as a colloidal solution.

The term peptisation is commonly applied to the formation of a colloidal

solution out of finely divided material. The simplest conceivable way in which a substance may be peptised is by fine grinding, and this is possible with a great many substances, perhaps with all, when the liquid used is suitably chosen. Generally speaking, minerals can be brought into colloidal suspension in this way if the water used be made slightly alkaline. More commonly lyophobic sols of metals and in-

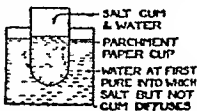
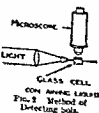


FIG 1

organic substances are prepared by precipitation, this is applicable in the case of metals such as gold, silver, platinum, and mercury, but since it necessarily means the presence in the liquid of a considerable amount of dissolved salt, the product of the reaction, success is only obtained when certain conditions, which can only be found by experiment, are carefully adhered to. Thus silver solutions are readily reduced with formation of metallic silver by organic substances such as citric acid, formalin, and so on, this process is well known as a means of silvering glass. By working very carefully and with very dilute solutions, the silver, instead of being thrown down as a mirror on the reaction vessel, remains in colloidal solution.

The lyophilic sols are of much greater practical importance, in fact, the chemistry of living organisms, and also of their useful products, belongs entirely in this category. Starch, gelatine, white of egg, gum, dissolve in water quite easily with the formation of typically colloidal solutions, which, as everyone knows, are quite stable as regards the addition of salts and other substances, though some of them, such as white of egg, are coagulated by heat. These solutions are as a rule very viscous, and they are also characterised by a very low surface tension. This fact is well known to everyone by the ease with which froth is formed in such solutions, soap solutions belong

in this category and a soap lather is possible because the surface tension of the water is greatly lowered by the soap the same applies to substances such as saponin which in minute quantities causes a strong froth to be formed on beer. The "detergent" or cleansing power of soap depends upon



two factors (1) its formation of froth by which the particles of dirt are captured and (2) its power of causing the oil and grease to form a stable emulsion.

Soap does not as is often supposed dissolve grease but peptizes it especially when assisted by rubbing and protects the emulsion so formed from again coalescing and the same is true also of particles of soot and dust. It is certain that most of the phenomena taking place in living cells lie within the province of colloid chemistry but they are of stupendous complexity and colloid chemistry is only beginning to lead us to an understanding of some of the more simple cases.

Colloid chemistry is rapidly growing in technological importance in fact it is easier to name the few cases in which it has an particular importance than the innumerable applications of its principles. All industries dealing with organic materials cellulose fibres leather hair paints dyes etc. are concerned with it as are also the lubrication of machinery the manufacture of wireless valves the treatment of mineral ores and the use of powdered coal in oil as fuel (colloidal fuel). See also ELECTROSMOSIS.

Collops. Minced, minced meat fried with onion until brown and then cooked slowly with stock.

Recipe

$\frac{1}{2}$ lb raw juicy beef 1 onion
 $\frac{1}{2}$ tablespoonfuls breadcrumbs
 $\frac{1}{2}$ oz dripping $\frac{1}{2}$ pint stock
 Seasoning

Fry finely chopped onion in dripping add minced beef. Cook until brown add stock and simmer for $\frac{1}{2}$ hour. Absorb the fat and stock with bread crumbs which should be added 5-10 minutes before serving. Pearl barley or rice can be used instead of bread crumbs.

Collotype see PHOTO ENGRAVING

Collusion, a secret agreement between two persons to defraud especially to deceive a court of law as by an agreement that one spouse should commit adultery so that the other may obtain a divorce. Such deception is punishable and may lead the Court to reverse its judgment or decree. See also MARRIAGE.

Colman, George (1769-1836) English dramatist son of the author of *The Jealous Wife* succeeded his father in the management of the Haymarket Theatre in 1789. His own plays include *The Heir at Law* (1797) and the less well known *Ways and Means* (1788) and *John Bull o' the Englishman's Fireside* (1803).

Colmar French town capital of department Haut Rhin situated a few m from the German border. It has considerable textile manufactures and other industries are wine-making brewing machinery and sugar refining. Public buildings include the 13th cent Catholic Church the Lutheran Church museum (formerly a 13th-cent monastery) and the Trade Hall. Pop 43,170.

Colne town in N.E. Lancs c 25 m F.N.E. of Blackburn with an important textile industry. Colne was well known as early as the 14th cent for the excellence of its woollens. There is a 16th-cent grammar school. Pop (1931) 23,790.

Colocynth, see CLICORBITACEAE.

Cologne (Ger Köln) city of Rhenish Prussia on the Rhine 25 m by rail from Düsseldorf. By reason of its commanding position as a river port and railway centre and its proximity to large coal and iron mines Cologne is of great commercial importance. Local manufactures include cotton and

woollen goods, sugar, eau-de-Cologne, machinery, and chemicals, there is a trade in coal, minerals, grain, and many other commodities. The cathedral is a 13th-cent Gothic structure, though it was not completed till the 19th century. The oldest church is the Romanesque St Maria im Kapitol (11th cent). Amongst other ancient churches are St Gercon and St Kunibert (see ARCHITECTURE, CONCRETE or HISTORY). There are several historic commercial houses, since Cologne was once an important centre of the Hansatic League.

Cologne (*Colonia Agrippina*) was a Roman town c. A.D. 50, falling to the Franks four centuries later. Trade began early, and by the 11th cent. Cologne had achieved European importance. Later, Protestant and Jewish persecutions impoverished it, and during the Napoleonic Wars it dwindled in importance. The growth of modern commerce and manufactures steadily re-established it, and it is now the third or fourth city of the German Republic. The British Army of Occupation had its headquarters in Cologne from Dec 1918 until 1926. Pop 740,000.

Colombia, a republic, in the extreme N.W. of S. America, bounded N. by the Caribbean Sea, W. by Panama and the Pacific, S. by Ecuador and Peru, and E. by Venezuela and Brazil. The surface is a low and extensive plain in the S. and S.E., and an extension of the Andes, with its tablelands and valleys, in the W. and N.W. In the N.W. corner is the plain of the R. Magdalena.

The mountains divide into three almost parallel ranges, the Occidental, Central, and Oriental Cordilleras, between which are the valleys of the Magdalena and Cauca rivers. The central and highest range culminates in Tolima (18,500 ft.), but the Oriental, whose slopes are gentler, includes the rich table lands where the bulk of the population is found. The W. Cordilleras are very wet, slope sharply towards the Pacific, and are covered with luxuriant forests. The rivers may be

divided into three principal systems: the short and turbulent streams from the W. Cordillera into the Pacific; the Magdalena and its tributaries which rise in the S. and flow through the valleys N. into the Caribbean, and the many tributaries of the Amazon system which flow E. and S.E. across the plains, and include the Caqueta and Apaporis. Much of Colombia is humid and unhealthy, but on the cooler slopes of the E. Cordilleras a large agricultural population thrives. Coffee is the chief crop, more than 1½ million bags (130 lb.) being produced annually. In addition, there are large crops of bananas, rubber, tobacco, and cotton. Cattle-raising is carried on very widely.

Colombia is extremely rich in mineral deposits, especially petroleum, of which large quantities are exported, and still larger remain untapped. The mountain regions also yield coal, gold, platinum, silver and emeralds. The country has not many manufactures, though the cigar and cigarette industry is prosperous, and there are cotton mills, breweries, and Panama-hat factories.

Timber is a prospective industry for Colombia, as much of the country is very rich in trees, including the mahogany, pine, oak, eucalyptus, and palm. Among the native animals are the jaguar, tapir, and armadillo. Fish are plentiful, and there are alligators in the N. rivers. In the lower regions myriads of insects are a danger to health.

The population is made up of Europeans, Indians, mixed races, and negroes. Spanish is the official language, and the Roman Catholic religion is general. There is provision for public education, but the percentage of illiterates is still high. The government is carried on by a President, a Council of State, and Congress, consisting of the Senate and the House of Representatives, elected by popular vote of the reasonably literate. The principal towns are Bogotá (cap.), Barranquilla, Manizales, and Pasto,

ports include Cartagena Buenaventura Puerto Colombia and Santa Marta

Colombia was first visited and settled as New Granada by Spanish seamen and traders in the early 16th cent. In the early years of the 19th cent a persistent struggle led by Simon Bolivar was made to throw off Spanish dominion and the Republic of New Granada which included Colombia Panama Venezuela and Ecuador was formed in 1819. Ten years later Venezuela and Ecuador withdrew and in 1831 the republic was reconstituted. For a number of years intermittent civil war followed which did not end until the beginning of the 20th cent. In 1861 the name was changed to the United States of Colombia and 20 years later the single word Colombia was adopted. Panama seceded however in 1903. In 1918 the historic dispute with Nicaragua as to the possession of certain islands in the Caribbean was settled. The area is now 470 000 sq m. pop. 8 000 000.

Colombo capital and principal port of Ceylon. It has a great volume of trade and is a notable port of call. Many of the great tea and rubber plantations are administered from Colombo which is the commercial as well as the governmental centre of the island. The harbour has been greatly improved and extended and is now one of the finest in the E. The town is well laid out and there are a number of parks, gardens and sports grounds. The climate is healthy on the whole. Buildings of note include Government House the Law Courts Queen's House (the Governor's residence) the University various churches and the Buddhist temple. Pop. (1931) 84 000.

Colón port and railway centre at the N. end of the Panama Canal. Its huge passenger traffic and commercial activity place it in the forefront of Central American ports. Docks and harbour works are modern and highly developed. Its early record of unhealthiness has been reversed by the work of American drainage and sanitary engineers. Pop. (1930) 57 000.

The town is named after Columbus (Spain *Colón*).

Colonel the commanding officer of a regiment or an officer of similar rank on the general staff.

Colonial Office the department of State through which the sovereign communicates with British colonies and dependencies appoints Governors etc. Until 1859 it was combined with the War Department. Since 19 the business of the self governing Dominions has been withdrawn from the C.O. and placed in the charge of a separate Dominions Office. The C.O. is in charge of a Secretary of State always a member of the Cabinet (// v).

Colonna nobl. Roman family. Its founder was Pietro (c. 1100). Lord of Colonna. The Colonnas appear in the 12th cent. as counts of Tusculum in feuds with the Orsini and the Gætanis and later with Pope Boniface VIII who excommunicated them in 1297 but was defeated by Sciarra Colonna 1303. Pope Martin V (1417-31) was a Colonna and extended the family estates. The family produced generals statesmen and prelates. Marc Antonio Colonna commanded the papal forces at the battle of Lepanto 1571. There are now three lines of the family—the Colonna di Paliano the Colonna di Sciarra and the Colonna Romano.

Colonna, Vittoria (1490-1547) Italian poetess. Knew Tas. in her youth and in later life was a friend of Michelangelo. In the times when female virtue was not common in Italy he was honoured for her purity. Her best poems are religious and were published under the title *Rime Spirituali*.

Colonnade a row of columns frequently covered with a roof projecting from an adjacent building. Common in ancient Greece it is used also to-day to protect markets and shopping centres from bad weather. See also PERISTYLE PORRICO.

Colonsay island of the Inner Hebrides off the coast of Argyllshire Scotland separated from the island of

Jura by the Passage of Colonsay The island is believed to have been visited by St Columba in the 6th cent, and there are the ruins of an ancient priory It is only a few sq m in extent, and a little sheep-rearing is carried on Pop 300

Colony, a district populated by strangers from another country, to which it becomes subject Colonising on a large scale is due chiefly to warlike ambition (as in the case of mediæval Turkey), to the desire to control sources of natural wealth (e.g. Spain in 16th, England in 19th cent), to political or religious pressure at home (e.g. ancient Greeks and Pilgrim Fathers), or to the overflow of domestic population (e.g. Japan) There is a tendency, already marked in ancient times, for colonies to develop towards independence and autonomy This may be clearly traced in the British Empire in the development of Crown Colonies into self-governing Dominions

Ancient Greek colonies were independent city-states founded by emigrants from a mother-city The Greeks planted colonies of settlers in Italy, Sicily, and on the shores of the Ægean Some of these colonies became more important than their mother-cities, e.g. Byzantium (Constantinople), which was originally a colony of Megara Rome itself is said to owe its origin to settlers from the obscure Arcadian town of Pallantium

Roman colonies were settlements of Roman citizens, usually veteran soldiers, in a conquered country e.g. Corinth in 46 B.C., and Colonia (Cologne) in A.D. 50

The modern race for colonies was begun by Spain and Portugal in the 16th cent, followed by England, Holland, and France in the 17th and 18th It culminated in the 19th cent with the division of Africa, the annexation of Siberia, Central Asia, and Transcaucasia by Russia, and intensive British settlement in Australia, Canada, New Zealand, and S. Africa Germany and Italy, achieving their unity late, were last in the field, and

succeeded in obtaining only minor territories in Africa The only important example of colonisation in the 20th cent is that of Korea and Manchukuo by Japan

The division of all unoccupied territory, the abandonment of conquest by war in most civilised countries, the prohibition of immigration into the United States, Australia, and elsewhere, make the current problem of an outlet for expanding industrial populations extremely difficult Two countries whose rate of increase is high—Italy and Germany—have no suitable colonies to receive their excess, since the latter lost all her oversea territory after the World War, and the former's possessions in Tripoli are unsuitable for white colonisation Japan also finds herself in the same position, and has been forced into colonising activities, both peaceful and warlike, on the Asiatic mainland With the abandonment of the 19th-cent principle of colonisation, it is clear that some other method of geographical adjustment in world population will have to be found

Colophon, the name given to the notice, found at the end of a MS or printed book, of the name of the scribe or printer and the date and place of issue, etc Said to be derived from the town of Colophon, in Asia Minor, the cavalry of which was so excellent that it always decided the issue of any battle in which it was engaged, hence, perhaps, the word came to mean the finishing stroke or final flourish

Colophony, a resin obtained as a residue in the vessels in which crude turpentine is distilled, it is also known as common resin and pine resin (or rosin) There are numerous grades of colophony, and the various qualities are indicated by lettering, from B (the darkest) to WW (water-white), the best resin can be obtained in the crystalline state by re-crystallisation from petroleum ether solution The chief constituent of resin is *abietic acid*, which occurs in it in various isomeric modifications Colophony is used in

various industries the principal being the manufacture of soap varnishes linoleum sizes etc

Colorado (1) Central State of the United States bounded N by Wyoming S by New Mexico E by Kansas and W by Utah. The surface consists of uplands and high plains rising to a mountain mass part of the Rockies including the Rampart Flk San Juan and other ranges. Among the highest mountains are Pike's Peak and several others all more than 14 000 ft. Notable geographically are the great plateaux or parks on the E slopes of these mountains the sources of several of the most important rivers are in the parks including the N Platte the Rio Grande S Platte and Colorado.

Colorado is especially famous for its mineral wealth there are large deposits of gold and silver coal copper iron petroleum radium and lead. Gold and silver appear to have reached the peak of production in the first 20 years of this cent but coal still yields upwards of 10 million tons annually. There are valuable mineral springs which together with the healthy climate give the State considerable medical importance. Intensive irrigation has made Colorado important agriculturally and millions of acres are now given over to cultivation or pasture. Notable products are grain of all kinds potatoes sugar beet fruit and cattle. Among the industries based mainly on the natural wealth of the State are beet-sugar manufacture meat production and packing engineering flour milling and dairying. The towns include Denver the capital (88 000) Pueblo (50 000) and Colorado Springs (33 000). Area 104 000 sq m pop 1 036 000.

(*) River in the W of the USA formed by the junction of the Green and the Grand Rs. The united rivers flow SW through Utah turn S in Arizona and form part of the boundary between Nevada California and Arizona. The Colorado crosses the Mexican border and flows finally into

the Gulf of California. Its course has cut many great ravines the most famous is Grand Canyon more than 70 m long and several thou and ft deep. The river is navigable for about 600 m its length being c 2000 m and its drainage area 245 000 sq m.

Colorado Beetle, a striped beetle resembling a ladybird in shape and very destructive to potato crops esp in the United State. Both larvae which are reddish grubs and adults feed on the leaves and there are two generations each year. In 1877 it reached Europe but was prevented from establishing itself in England although a small infestation was noted at Tilbury in 1901. A further outbreak also at Tilbury took place in Aug 1933. It has been introduced into France and on this account the British Government placed an embargo on all French potatoes from March 1934.

Colorado Springs a town in Colorado USA at the foot of the Rocky Mountains. It is a popular summer and health resort on account of its mild climate and magnificent scenery. Colorado Springs is an important railway junction and the headquarters of mining companies. Near by are the Manitou mineral springs and the Garden of the Gods a district of bright-colored sandstone peaks.

Colorado Springs possesses ore-reduction plants smelters railroad shops and saw mills and does a considerable trade in cattle. Pop (1930) 33 30.

Colorimetry the measurement of the depth of colour of liquids for the purpose of inferring their chemical composition. Many very convenient reactions are known which enable traces of some chemical substance in a liquid to be detected and estimated by the production of a coloration when some reagent is added (e.g. the test for ammonia by Nessler's reagent (q.v.)). In order to eliminate as far as possible slight variations in the quality of the reagents and water used it is usual to compare test

It helps a beast of prey to escape the notice of its quarry, and it helps the latter to hide from the former. One of the simplest devices for concealment is known as "counter-shading," which obliterates the lights and shades upon which the appearance of solidity of a body depends, the shadows of the lower parts under light from above being cut out by white and the illuminated upper part darkened to lessen the reflected light. That is the explanation of the pale belly and darker back so noticeable in many fishes, mammals and other animals, especially those exposed to light near the surface of the sea or in the open on land. Gazelles, for example, harmonise with their desert surroundings because the light falling upon the back makes their tawny hue match the sand and the white of the belly counteracts the shadow of the body, even the white on the back of the thighs counteracts the shadow of the rump when they are in a perilous state of repose. An unusual instance of "counter-shading" is illustrated by some African cat-fishes which habitually swim upside down at the surface of the water. In these the ordinary arrangement of colours is reversed, the belly being brown and the back silvery.

"Counter-shading" is, however, commonly supplemented by another method of obliterating shape, namely, by what is called a disruptive pattern. This is especially common in forests where sunlight passing through foliage produces a chequered effect upon objects. Hence the black and yellow pattern of forest cats, like leopards and ocelots, and the white spots and bands of many woodland deer, especially of the helpless fawns. Even the brilliant hues of such birds as macaws are inconspicuous in the forests of Brazil. The most remarkable instance of disruptive pattern for concealment is, however, supplied by zebras. At a distance the black and white stripes blend to a uniform grey and they break up the outline and by varying in direction and shape on different parts

obliterate the continuity of the shape of the body. The zebra furnishes one of the best illustrations of the necessity for seeing an animal in its natural environment to understand the purpose of its colour. Equally illustrative, however, are many species of brilliantly coloured and strikingly banded marine fishes which haunt coral reefs in tropical seas.

More familiar and obvious instances are supplied by birds, especially those that nest on the ground, like game birds, plovers and waterfowl, who, trusting instinctively to their concealment, will almost allow themselves to be stepped on before taking wing, while their striped or mottled nestlings, hidden in the herbage. Very frequently the colour-effect is enhanced by the shape of the animal, as in the goat sucker which resembles a lichen-covered bit of a dead branch, the tortoise-shell butterflies, which, when resting with wings uplifted, are exactly like dead leaves, and some spiders, plant-bugs which rest on the tops of leaves and simulate patches of bird-dung. Such special instances are usually called "protective resemblance" (*qv*). In some marine animals concealment is effected by almost complete suppression of pigment resulting in translucency. Illustrations of this are the larva of the eel, the common shrimp, which can scarcely be seen resting on the sandy bottom, and the common prawn which shines through the water like a ghost.

Many cold-blooded animals have the power of changing colour to match their surroundings. A famous instance is the chameleon which, usually greenish, can alter its tint to yellow, white, or black, and can lighten the side of its flattened body which is in shadow to match the other exposed to the light, thus "counter-shading" itself. Similar powers of colour adjustment are possessed by frogs and many fishes, like the flounder for instance, which can change its hues to match the sea-bottom on which it rests. Cuttle-fishes also have the same

faculty which in all these cases results from the expansion and contraction of the coloured areas or chromatophores in the skin which through the eyes are acted on by the nervous system.

But although a great many animals are coloured for concealment there are others which are exempt from the need of it like elephant, rhinoceroses, buffaloes and others. These like negroes are uniformly dark coloured probably as a safeguard against tropical heat. Similarly some arctic animals like the Polar bear are white or like the fox hare and ptarmigan turn white in winter as a protection against cold although no doubt this also serves for concealment in the snows. For an account of colours which make for conspicuousness see **MIMICRY PROTECTIVE RESEMBLANCE AND SECONDARY SEXUAL CHARACTERS**.

Colour in the Home One of the most important aspects of home decoration and one that contributes most to the production of a satisfying room is colour. Furnish a room well and apply its colouring wrongly and it will never be really successful. Haphazard decoration without consideration of the room's aspect and also the uses to which the room is to be put are the chief causes of failure. Generally speaking rooms which do not receive much sun should be decorated with a predominance of warm colours—yellows, orange, brown and pink—while those having a bright sunny aspect may be made to look cool in summer and at the same time comfortable in winter by the wise choice of such colours as greys, greens and blues. The amount of any particular colour used should also be considered for an effect can be entirely lost or spoilt by an over or under application of the appropriate colour.

The walls are the largest area in any room and their colour is therefore of primary importance. The carpet is the next largest area, followed by the curtains and upholstery with small accessories such as cushions and lamp-

shades last. The walls therefore should be treated with the key colour of the room and the carpet should be of a darker shade to harmonise with it while brighter colours can be introduced for curtains and upholstery. If the floor covering is considerably lighter than the walls an unbalanced effect is given to the room.

A small room should always be decorated in a fairly light colour and the woodwork and doors painted to match the walls. The frieze—if any—should be a lighter shade of the wall colour and the ceiling the same and care should be taken not to emphasise the small size of the room by a dark picture rail contrast. A patterned fabric with a ground approximately that of the wall colour is an excellent choice and can be repeated for any upholstery covers required. Needless to say the pattern should not be large or it will prove worrying. A plain carpet or one with a small all-over pattern or with pattern in the border only is the best choice. Fitted furniture painted a light colour can give an impression of space in a small room.

In the large room particularly of the very lofty type frequently found in the converted Victorian houses which constitute so many of the mansions of to-day a deep frieze can be employed to reduce the apparent height of the room and frieze and ceiling should be of as dark a shade as can be suitably used. Large-patterned cretonne in bright colours may be used in such a room but it is doubtful whether a large patterned carpet unless of sober colours is effective. In any case the patterns should never clash. In the small house a feeling of spaciousness is given if all the rooms and hall or landing of the same floor are decorated in one colour. The effect is by no means monotonous for if a good neutral colour such as cream, pale buff, ivory or biscuit is used practically any colour can be used for curtains, carpets, etc. to give individuality to each room. In a similar way may be used throughout.

granite or jaspé pattern in a good shade of brown provides a pleasant background for almost any carpet or rug, and the look of continuity given by the one colour adds considerably to the appearance of size and to the harmony of the entire floor. This principle of continuity should be kept well in mind when decorating the average house, and is being outstandingly emphasised by modern decorators. Generally speaking, colour schemes are far more restful and less obtrusive than formerly. Strong lines of demarcation, particularly in wall surfaces, have disappeared, one colour with variations of it is used for a room or even throughout a house with strong contrast—if at all—in very small quantities.

It is not, of course, possible for the majority of people to redecorate their entire houses in order to conform to modern taste, but if care be exercised in the choice of colours for each room as its time for redecoration or replacement of soft furnishing falls due, and thought be taken for the house as a whole, improvements may be gradually effected without undue expense.

The kitchen should, in the interests of hygiene, be decorated in a fairly light colour, and some very pleasant schemes can add brightness to an otherwise dull room. Walls of corn-coloured enamel or glossy paint, with woodwork of Dutch blue or a clear green, are practical and pretty, with the floor covered with a green or tiled-red granite-patterned linoleum. Curtains may be of blue or green-and-white cotton.

For the small bathroom the usual all-white scheme with colour in floor covering, bath mat, and curtains gives the appearance of size, though there are more colourful possibilities for a larger room.

Colour Music, music whose sounds are simultaneously translated into equivalent colour tones. An analogy between colour and sound has been frequently observed by musicians and scientists, and as far back as the 18th

cent Castel (1688–1757) devoted much thought and experiment to the subject. In recent times the most notable advocate of the theory has been the Russian composer Scriabin, who composed for his orchestral work, *Prometheus*, a colour accompaniment demonstrated by a special mechanism when the work was performed in New York in 1915.

Colour Photography, see PHOTOGRAPHY IN COLOURS.

Colour Printing, see PRINTING.

Colours, Military, the standards and flags carried by cavalry and infantry regiments, have their origin in the armies of earliest times. Colour served as a rallying-point in battle and as the distinguishing mark of a particular regiment, becoming identified with the honour and prestige of the body concerned. From the early part of the 18th cent., each British regiment has carried a king's colour (the Union Jack), and a regimental colour, or flag with the facings, names, titles and victories of the regiment.

Colour-Sergeant, a British Army rank created in 1813 at Wellington's suggestion. The colour-sergeant "attended the colours" (*q.v.*), and was senior N.C.O. of a company. The rank was abolished in 1912.

Colt, Samuel (1814–1862), American inventor of the revolver of that name. At the age of 15 he constructed a wooden model of his invention. In 1835, he patented the six-barrelled revolver and set up a factory at Hartford, Conn., which grew into a large and successful business.

Colt's-foot, family Compositæ, is one of the first flowers of spring, the flowers appearing before the leaves on stalks which spring directly from the roots, and are covered with scale-like bracts, each bearing a single yellow flower-head, with numerous yellow rays. The leaves are roundish, heart-shaped, and angular, with dark teeth and are cobwebby above and covered with cottony down beneath. The heads of flowers droop before expansion and the stalks lengthen considerably after flowering. The cottony

the leaves was formerly used as tinder and the leaves themselves are rolled into cigars and smoked as a remedy for asthma. Colts foot is a pernicious weed and abounds in clayey fields.



Colt foot.

Colugo
see FLYING
LEADER

Columbia, St (5.1-5.7) Irish saint and missionary to Brit ain where he founded the Irish monastery of Iona to whose jurisdiction the Church in Scotland was long subject. 1st June.

Columbia, capital of S Carolina USA situated on the Congaree R.

he city stands in a good agricultural district and has large manufactures of cotton goods and agricultural machinery. The educational institutions include S Carolina College and Benedict Negro College. Pop 61 600.

Columbia, British, see British Columbia.

Columbia, District of, the seat of the Federal Government of the USA. It is a rectangular territory artificially bounded c 0.5 sq m in extent originally constituted (1791) from lands ceded by Virginia and Maryland though in 1846 the Virginian portion N of the Potomac R. was returned. The territory was contrived so that the district should possess the capital and the

seat of Government should not fall to any one of the then constituted States.— Washington is co-extensive with the District. Local government is carried out by special committees from each of the Houses of Congress with the result that there are no municipal elections neither is there any electoral franchise within the district residents being obliged to vote as from their native States or not to vote at all if they were born in the locality.

There are a number of industries of which printing is the most important most of the inhabitants are civil servants. Educational institutions include the George Washington the Georgetown and National Methodist Universities. For pop etc see WASHINGTON.

Columbia River N American river rising in British Columbia in the W Rocky Mountains and flowing first N W then almost due S to cross the American border. It empties out into the Pacific. Some part of its course flows through beautiful gorges and there are several falls providing valuable power. The salmon fisheries are of the first importance. Draining area is c 260 000 sq m length 1450 m.



Columbine (*Aquilegia vulgaris*), plant of the Ranunculaceae family. The wild columbine is a purple, blue, or white flower, with five petals, each ending in an uncurved spur. The cultivated varieties are numerous, as the plant is a favourite species for experiments in plant breeding and crossing. They are perfectly hardy perennials, 12-18 in high, in every imaginable colour, from pure white, through pale lemon and orange to red, violet, and all shades of blue. The spurs are long and straight, or curved.

Columbium, the alternative name for the element *Niobium* (*qv*).

Columbus (1) capital of Ohio State, U S A, at the junction of the Scioto and Olentangy Rs, c 102 m from Cincinnati. Beautifully laid out, Columbus possesses imposing buildings, wide streets, municipal markets, and over 1,000 acres of public parks. The State University, with its 13,000 students, is an imposing structure. Columbus is an important commercial and industrial centre, coal and agriculture being chief industries. Leading manufactures include iron and steel, motor-cars, shoes, agricultural tools and glass. Oil-refining and meat canning are also carried on. Pop (1930) 290,500.

(2) Town in Georgia, U S A, one of the most important industrial centres of the S. Cotton goods form the largest manufacture, others being refrigerating machines, engines, boilers, furniture, bricks and tiles. The first cotton mill to be worked by electricity in the U S A was in Columbus. The R. Chattahoochee generates industrial power. Pop 43,100.

Columbus, Christopher (c 1450-1506), Genoese navigator and discoverer of the New World. He went to sea at an early age, and eventually went to Portugal to promote a plan to reach Asia by sailing westward. After many disappointments he succeeded in obtaining the patronage of Ferdinand and Isabella of Spain and on Aug 3, 1492, set out with 3 ships, of which the biggest was only 100 tons. On

Oct 12, land was sighted, probably the present Watling Islands in the W Indies. After discovering Cuba and Hispaniola, the largest ship, the *Santa Maria*, was lost, and the expedition returned to Spain. In 1493, Columbus sailed with more ships and men and discovered the island of Dominica. This time, he stayed 3 years in the W Indies, but factional quarrels broke out, and in 1496 Columbus returned to Spain. In 1498 he set out again and touched the N E coast of S America. The quarrels among the colonists continued, and in the following year Columbus was sent home, a prisoner in chains. However, his reception was cordial and he was taken back into favour by the Court. In 1502 he set out for the last time, still seeking a passage to Asia, and explored the Gulf of Mexico. He died in Spain in 1506. The town of Colon, Panama, perpetuates his name in its Spanish form.

Column, an upright support in a building, usually of stone, with a decorated base and capital (*qv*). Used from the earliest times, its origin is presumably in the use of tree-trunks as roof supports in primitive building. Nelson's Column is probably the best-known example in Britain of a column used as a memorial stone. See also ARCHITECTURE.

Column, a military formation in which units are ranged one behind the other instead of side by side as in line. The four companies of a battalion in column are separated by a distance equivalent to the frontage of the company, so that line can be readily formed.

Colure, see OBSERVATORIES.

Colvin, Sir Sidney (1845-1927), English critic of literature and art, published lives of Landor (1881) and Keats (1887, *English Men of Letters* series) and an edition of Stevenson's works (1894-7), as well as several valuable works on engraving and painting. He was Slade Professor of Fine Art at Cambridge from 1873 to 1885, and Keeper of Prints and Drawings (1884-1912) at the British Museum.

Colwyn Bay popular seaside holiday resort of N Wales on the Denbighshire coast. It has a fine promenade more than 3 m long which links it with the neighbouring towns of Rhos-on-Sea and Old Colwyn. Pop (1931) 90895.

Colza Oil, alternative name for *rape oil* (q.v.)

Coma may be defined as a state of unnatural unconsciousness from which a person can be roused either not at all or only partially and for a very short period of time.

Normal consciousness depends upon the continuance of a normal blood supply to the brain. That is to say the blood must contain adequate quantities of oxygen and the correct proportion of blood sugar—the latter being neither in excess nor in decrease of the normal limits. In addition the blood must contain no poisonous or toxic substances. And last but not least it must reach the brain and having reached it must then be drained away.

It is described in the article **CIRCULATORY SYSTEM** how in certain circumstances there is a dilatation of the blood vessels of the body when it is subjected to certain emotional states. When for instance the body is in a condition of shock there is a dilatation of all the blood vessels in the abdomen in consequence of which if the body happens to be in the erect posture—whether this be sitting or standing—a great quantity of blood will flow into the abdominal regions leaving an insufficient amount to supply the brain above. As a consequence of this the brain loses consciousness and allows the body to fall limp in what is popularly known as a "faint".

Bloodlessness of the brain can also be brought about by loss of blood from the body through wounds or other channels and here again the result is similar to fainting. But there is a condition of the heart in which the beat is very slow—perhaps as slow as once in 40 seconds—and here too the brain may get so little blood that

consciousness may be lost between the beats. This latter condition is known as Stokes Adam's disease.

In cerebral hæmorrhage there is a sudden rupture of a cerebral blood vessel. It generally occurs in people above the age of 50 in whom the blood vessels are in a state of deterioration and whose blood pressure has become high as a result of the decreasing elasticity of the blood vessel walls.

Thrombosis consists in a gradual clotting of blood in a cerebral blood vessel until finally the clot successively blocks the blood-supply to the brain tissue. This may occur in people of any age and is caused by a roughening of the blood vessel wall by such a disease as syphilis or it may result from a feeble flow of blood through the blood vessel as a result of cardiac enfeeblement following upon exhausting diseases.

Embolism which is the third of this group of disorders consists of a blockage of a cerebral blood vessel by a clot which has travelled in the blood stream from another part of the body. This occurs frequently in young people who suffer from rheumatic heart disease in which condition clot-like vegetable formations occur on the inside of the heart walls and are easily broken off into the blood-stream as it flows through. The above three conditions take the form of an apoplectic stroke.

Turning from conditions caused by lack of normal blood supply to the brain to those cases in which there is an efficient blood supply but a disordered quality of blood we will take first the case where the blood does not contain enough oxygen. This may be due to a lack of sufficient hæmoglobin in the blood to carry oxygen or it may be due to an incapacitation of the hæmoglobin which although present in adequate amounts has been damaged by poisonous substances. The essential part played by hæmoglobin in the carriage of oxygen by the blood is explained under **BLOOD** in which article it is also explained how lack of

hæmoglobin is the underlying mechanism of anæmia. It must be explained here, however, that in cases of gas poisoning by carbon monoxide, the essential mechanism causing loss of consciousness consists in a combination of the hæmoglobin of the blood with the carbon monoxide breathed in, thus rendering the hæmoglobin incapable of combining with and carrying the necessary oxygen. Poisoning in this way is the cause of death in gas-oven suicides, but it is also the cause of fainting in streets full of motor-cars which are contaminating the atmosphere by expelling this poisonous gas from their exhausts.

Secondly, there is the condition where the blood contains either too little or too much sugar, for as already mentioned, in both of these cases, coma is produced. In the disease known as *Diabetes Mellitus* there is a disorder of the pancreas which results in too little of a substance called *insulin* being poured into the blood. Now one of the effects of insulin is to regulate the amount of sugar in the blood. If there is not enough insulin in the blood, the sugar content becomes too high, and one of the consequences of this is diabetic coma. The disease can be controlled by the administration of insulin to the patient, by which process the blood-sugar content is lowered. If, however, it is lowered too much, the condition of coma is again produced, and is referred to as insulin coma. Whenever it is suspected that coma is due to one of these two causes, every caution is necessary, because the treatment in the one case consists in giving sugar to raise its content in the blood, while in the other case, it consists in giving insulin to lower it.

In now turning our attention to coma produced by a disordered function or disordered structure of the brain-cells, we are on less certain ground. Epileptic fits are usually followed by a period of unconsciousness, as are also other types of fits such as those following recovery from a head injury. In

neither of these can we understand clearly what is the mechanism, although probably we are correct in surmising that they are due to some permanent irritation of the brain cell which may take the form of pressure by the vault of the skull, or by maladjustment of the structure of the brain tissue.

There are, however, types of unconsciousness which can be attributed with more confidence to disturbance of function, and of these, the types most clearly understood are those due to the action of poisons of toxic substance. As an example of the former there is alcohol, which, like opium and the general anæsthetics, produces its effect by retarding the processes which take place inside nerve cells.

Lastly, some reference must be made to that type of disease which is often associated with dropsy, namely kidney disease, or nephritis. In this there is an impairment of the function of the kidney to excrete waste products such as uric acid and associated nitrogen compounds. When these accumulate in the blood, they produce a type of irritation to the brain which results in a very characteristic and distressing state of affairs, because it is frequently followed by a type of coma which unfortunately usually ends in death. This might be described as an effect produced by toxins in the blood in the form of waste products. It is certainly a convenient method of bringing an explanation of this type of coma into line with the other causes. Nevertheless, this description does provide that explanation of all the facts which remain dependent upon the acquisition of further information.

Finally, we must mention that type of unconsciousness which is known as concussion. It is believed by some people that the mechanism by which this type of coma is produced lies in a damage to nerve cells at the time of the injury. Others, however, hold the theory that the real reason is to be found in a rupture of the small blood vessels of the brain, producing a mild

form of apoplectic stroke *See also* MENINGITIS

Coma Berenices, constellation of small stars situated E. of Leo and above Virgo. According to legend it is the beautiful hair of Queen Berenice of Egypt (q.v.) who consecrated it to Aphrodite. The constellation is easily visible only on clear nights.

Comacines, *see* RED INDIANS

Comanches, *see* RED INDIANS

Comb (1) A toothed instrument used for arranging and smoothing the hair. The comb has existed in various forms and materials for thousands of years being used by the Egyptians and ancient Greeks. The combs that have been found in the Egyptian, Greek, and Roman tombs are made of either boxwood, ivory or bone. To-day they are made chiefly of tortoiseshell, celluloid and india rubber. (2) Term applied to a piece of machinery for dividing fibre in textile mills. (3) The red crest surmounting the head of a cock. (4) A collection of honey cells from a beehive.

Combe, William (141-1823) English author known to-day solely for his *Tower of Dr Syntax* (1809 etc.) humorous and somewhat didactic tales in doggerel verse with illustrations by Thomas Rowlandson.

Combination Laws, *see* TRADE UNIONS

Combines, Trusts and Cartels. The name trust is usually applied to an amalgamation or association of businesses with a view to monopolistic control of prices and production within a certain industry.

Although monopolies in a large number of industries were granted by the Stuart sovereigns and other instances can be traced from the Middle Ages onward, the formation of trusts in their present sense did not become important until towards the end of the 19th century. The early part of the Industrial Revolution, notably in England, had been characterized by absolutely free and unhindered competition. It soon became obvious that some modification of this principle

would be necessary in the interests of sounder economics.

Railway building in the thirties was undertaken by many scores of small companies which made themselves responsible for local lines of 40-50 m. in length. As these lines were joined up, gradual amalgamation of control became inevitable and in 1844 the Midland Railway was started with £5 millions capital to form the basis of a regional system. The advantages in economy of management, of directorship of rolling stock, besides the convenience of having to deal with only one authority instead of a dozen or more, were overwhelming and the process of amalgamation went on until in 1911 all British railways were combined into 4 main systems by Government intervention.

Similar advantages were to be gained by large-scale control in industry. A large concern needs little more management than a comparatively small one. It can maintain an up-to-date research department and a staff of expert technicians which a smaller one could not afford to do. It can procure raw materials more cheaply in bulk, obtain better terms for transport, power, advertising etc., spread its overhead expenses over a larger output and so cheapen the individual article produced. Moreover, waste products which are useless in small quantities may be profitably treated in bulk. Machinery can be more economically used by the larger unit and installed for minor processes which the small business must continue to do by hand.

In the eighties a movement grew up in America for shareholders in competing companies to assign their stock to a holding or trust company in return for interest thereon, oil and whisky being the first two commodities concerned. Gradually the term trustification was applied more widely to the whole for enlarging the unit of control in industry. In 1890 the United States Supreme Court declared trusts

This law was, however, circumvented in many ways, and in 1899 the Oil Trust of America succeeded in obtaining a Charter from the State of New Jersey, and became officially the Standard Oil Company. In 1900 183 industrial combinations were at work in America, and in the next year the United Steel Corporation was formed with a capital of nearly £300 millions to combine all the steel business of the country. The form of control was that of a new company issuing new bonds or stock in exchange for the bonds or stock of the constituent companies, without, however, interfering in their identity. All the officials of the constituent companies were appointed by the new one, and all profits pooled.

In Germany a similar tendency had crystallised into the *cartel* or selling syndicate. These associations, beginning loosely, but with a gradually acquired power of dictating production and fixing prices, tended to consolidate into the trust form, and in 4 great German industries—coal, potash, textiles, and steel—did in fact achieve that state after the War.

While the trust absorbed the identity of individual concerns, the *cartel* did not interfere with their management or finance beyond the fixation of prices and production. The latter form, therefore, was eminently suitable for international agreements between similar industries in different countries. Early examples in this field were the International Railmakers Association and the International Aniline Convention, while to-day the Continental Steel Cartel allots production quotas to all the important European steel industries, except that of Great Britain, and divides export markets among them.

The trust movement which had grown to such dimensions in the United States and Germany was also at work in Great Britain, where it more often took the form of tacit agreements and private understandings. In some industries, however,

combinations grew up, allotting quotas to constituent firms, which paid in or drew out from a reserve pool according as their production was above or below the standard set. The metal, textile, chemical, building, oil and petrol industries all had arrangements on these lines. Another important method of combination is by the service of the same directors on the boards of several companies, which may continue to trade independently under their own names.

Combines are usually classed as vertical—that is to say, those with unified control of successive processes in manufacture—or horizontal—that is to say, those with unified control of all concerns occupied with the same process. Horizontal combination is most common in highly skilled industries, vertical in heavy manufactures.

Several examples of the former are to be found in the cotton industry—combines such as Fine Cotton Spinner, Calico Printers and Bradford Dyer Messrs J & P Coats, controlling the majority output either of special processes (printing, dyeing, etc.), or special products such as sewing-cotton. There is also a tendency, however, for such horizontal combinations to combine into huge vertical combinations controlling all processes from the production of raw cotton to the sale of highly finished textiles.

A typical example of the vertical combination is that of Lever Bros., which controls a large proportion of the British soap industry. Formed in 1894 with a capital of £1,500,000, by 1920 the company had control over more than 140 others, and had raised its capital to £42 millions. Besides forming a horizontal combination of nearly 40 companies which manufactured soap, Lever Bros. extended vertically to obtain control over their supplies of raw materials, and their interests include banking, shipping, engineering, mining, building, whaling, seed-crushing, oil-refining, plantations, fisheries, drugs, chemicals, industrial gases, candles, disinfectants, polishes,

perfumery and paper. In addition they have built a large town Port Sunlight to house their workers.

The incidence of competition in different industries still varies enormously. In some particularly certain forms of land transport a virtual monopoly is essential for efficient service. The practical monopoly of the London General Omnibus Company and the London Underground Railway Company in their own spheres made for a regularity and comprehensiveness of service which might not be attained with competition. Yet even this degree of limited monopoly has been found insufficient and the London Traffic Act of 1933 provided for unified control by the London Passenger Transport Board of all forms of city transport—trams, buses, motor-coaches and underground railways. In most countries railways have become the monopoly of the State or of a very small number of private companies.

Ordinary industrial combination has tended to proceed farthest in those industries engaged in the production of a uniform and unvarying product in regular demand such as steel bars, sewing-cotton, cement and tobacco. Even here however some degree of competition is nearly always present and ready to increase immediately if prices are raised too high or production is dropped too low.

In many other industries with rapidly changing products and an un dependable demand such as ship building or small manufacturing combination has made little headway.

On the other hand the variability of demand is in itself one cause of the increasing number of international agreements with regard to the production of raw materials which now cover rubber, tin, copper, aluminium and many other primary products.

This brings us to the effect of combinations upon prices and production. The principal effect under both these headings is one of stabilisation, stabilisation of prices by the elimination of com-

petitive price-cutting and of output by the elimination of over production. Theoretically, the combine is able to produce goods more cheaply than the small firm. But in fact as far as can be ascertained its undisputed power tends to raise prices slightly above their previous level or to prevent them falling. Prices however will not be raised so high as to incur a fall in demand and again where production is limited in times of falling prices with a similar object in view it is only carried to the point of approximating supply with demand. As a counterbalancing factor the combine tends to ensure a higher and stable wage-rate for workers in the particular industry.

In general it may be said that the trust movement is typical of the more advanced stage of industrial development and is an attempt to reach greater efficiency and greater stability in production.

Combustion, the process of oxidation when it proceeds with sufficient violence and velocity to give rise to the easily apparent phenomena of light and heat.

Comedy *see* DRAMA.

Comenius, or **Komensky Johann Amos** (1592-1670) famous educationist was born in Moravia. He was one of the first advocates of the direct method of teaching language of the use of pictures in education and of the teaching of science. The works in which he developed these ideas are *Janua Linguarum reserata* (1631) and *Orbis sensu alium pictus* (1658). A Society (1892) and a Library (1871) were founded to propagate his ideals of education.

Comets luminous heavenly bodies characterised by a long tail. The origin and structure of comets are still uncertain but the usual view is that they are composed of a multitude of meteoric fragments not yet coalesced into a solid mass moving through the solar system independently of the planets. The two theories as to the composition of the tail are either that it

composed of fine matter which streams out behind the comet, and is blown back by the pressure of light from the sun, or that the comet in passing makes luminous the particles floating in space near the sun.

Comets mostly revolve in elliptical orbits round the sun in periods ranging from c 3 years to c 1 million years. A few follow parabolic courses and do not return. Those with periods of from 3 to 9 years are the most numerous and are called "Jovian" comets because their paths extend to the orbit of Jupiter. Some comets are bright enough to be conspicuous to the unaided eye, others are only visible with the powerful telescopes used in observatories. Four or five of the latter kind are usually seen every year. The best-known periodic comet is probably Halley's comet, which has a period of c 76 years and was last seen in 1910. Other well-known ones are Encke's comet with a period of just over 3 years, and Biela's comet, a twin, the two halves of which follow separate, but similar, orbits. It was last seen in 1852, and may have disintegrated since. In 1858 Donati's comet was exceptionally bright, this comet has a period of 2000 years. Comets are sometimes seen in daylight, the last occasion being in 1882. The earth is believed to have passed through the tail of the 1861 comet.

Comfrey, a large, handsome plant, belonging to the borage family, common in watery places and on banks of rivers. Often found in old-fashioned gardens. The stems are branched and leafy, 2-3 ft. high, winged in the upper part, leaves elliptical, pointed, tapering towards the base, and running down the stem, the flowers white, pink, or purple, drooping in forked clusters.

Comines, Philippe de (c. 1445-1511), French historian, held posts at the Courts of Charles the Bold, Louis XI, and Louis XII. His *Mémoires*, written between 1488 and 1493, and first published in Paris, 1524, contain a highly valuable account of his life and times, they

are marked by an unusually keen observation and insight into character and events. Scott's *Quentin Durward* contains a portrait of Comines.

County of Nations, in international law, the bond of friendliness and self-interest between nations which lead them to recognise each other's laws and is the foundation of diplomatic honours and courtesy.

Commander: (1) In the British navy rank below captain and above lieutenant-commander. (2) Member of one of the classes in certain orders of knighthood, e.g. *Commander of the Bath*.

Commander-in-Chief in the navy is the admiral in chief command at a naval station, e.g. *Commander-in-Chief Portsmouth*. In the army the office exists only in time of war, thus on the Western Front in the World War Earl (then Sir Douglas) Haig was from 1915-1919 *Commander-in-Chief of the British Armies in the Field*.

Commandery, a name given to the former grants of landed property belonging to the Knights of St. John of Jerusalem. A Commander of the order was placed in charge of each such division.

Commedia dell'Arte, a form of early Italian comedy, directly descended from and closely resembling the *Atellana Fabula* (q.v.). It was at its best in the 17th cent.

Commencement, the ceremony at Oxford at the close of each year when degrees are awarded. It has always been opened by a Latin oration, and is an occasion for visits to the University by friends and relatives of the students. It is the custom to bestow honorary degrees on distinguished persons on this day.

Commendations, see FEUDALISM.

Commensalism, (lit. "table companionship"), the regular association of different species and genera of plants and animals living together but independently. Either or both species may benefit by the association. For example, certain bacteria and fungi grow together on a substratum.

on which either will grow separately but when the bacteria are present the fungi grow better and are more fruitful. In obtaining their food the bacteria change the substratum improving it for the fungus. The different kinds of bacteria found associated in influenza probably help one another in their selection and decomposition of food. The crocodile bird pecks scraps and parasites from the teeth of the crocodile. Small sea anemones are carried about by certain crabs by movements of their tentacles capturing small animals larger ones not completely swallowed are seized by the crab. The anemone probably gets more food owing to its transportation since it cannot perform movements for itself. Bird's-nest orchis and other saprophytes (*q.v.*) are common in beech woods: the trees provide the necessary shade and their leaves form the humus constituting the food of the saprophytes. The closer the association in commensalism the more likely it is to degenerate into parasitism (*q.v.*). See also SYMBIOIS.

Commercial Court, established 1896 and presided over by a single judge for the speedy trial of commercial cases in the High Court. See also COURT.

Commercial Traveller, a wholesaler's representative who travels in a specific area to solicit orders from retailers for the products of his firm. His remuneration may be in the form of salary or commission or more usually a combination of the two. There are various organisations catering for the commercial traveller.

Commercial Treaties, contracts between States relating to commerce navigation jurisdiction tariffs quotas and other trade matters. England made commercial treaties with Norway in 1217 Sweden 1664 Portugal 1703 and the famous Convention of Commerce and Navigation with the United States in 1815. The Cobden treaty with France in 1860 was the first commercial treaty made with the aim of reducing tariffs. The 18th and 19th cents saw an increase

in the trading rights allotted to aliens and after c. 1890 treaties were more wholly concerned with details of tariffs etc. The 19th cent Capitulations between European and E. countries provided for extraterritorial rights for European subjects in the East (see EXTRATERRITORIALITY).

Under free trade Great Britain bargained with the most favoured nation clause a guarantee that the nation in question would receive all the privileges and benefits of trade allowed to any third nation. This concession might be made gratuitously or in return for a reduction of tariffs or other advantage accorded by the other party. In certain cases notably in treaties between the United States and Hawaii Cuba and Mexico stipulations were made that the privileges granted were not to be made to any other nation. Another basis for bargaining frequent on the Continent is the maximum and minimum tariff system the former applying to all countries where special treaties enforcing the latter have not been made.

The post War years have brought a new outbreak of economic nationalism though Germany was forced for a time to allow most favoured nation treatment to the Allies by the Peace Treaty of 1919. In 1927 an economic conference at Geneva took some steps towards removing some of the rapidly growing restrictions.

The depression of 1930 was responsible for exchange regulations restrictions and import quotas. In 1932-3 Great Britain adopted a protectionist policy allowing specially favourable treatment to the other members of the Empire by the agreements of the Ottawa Conference 1932.

Bargaining with other countries continued for the conclusion of bilateral treaties such as that between England and Denmark (1933) in which Denmark agreed to admit certain British machinery coal metal manufactures etc. free to take 80 per cent of her coal imports and all the materials required for the manu-

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facture of her dairy exports from Great Britain, to reduce duties on other British goods, etc., while Great Britain agreed to take minimum quantities of butter, eggs, and bacon, and in the case of a quota to allow Denmark at least 62 per cent of her bacon and ham imports and 38 per cent of her egg imports. Methods of reaching greater commercial freedom were discussed, without much concrete result, at the World Economic Conference (qv) of 1933.

Commination, a service in the Anglican Book of Common Prayer used on Ash Wednesday. Its main feature is a recital of curses, culled from the Scriptures, against sinners.

Commissar, an administrative official in Soviet Russia of varying rank, the highest being in charge of a State department and corresponding to a British cabinet minister, e.g. People's Commissar for Foreign Affairs.

Commissariat, the army department which supervises the supply of food and forage to the troops, and its transport. In the British Army the duties are assigned to the Royal Army Service Corps, which is concerned with both supply and transport. The corps is under the direction of the Director of Supplies and Transport, who is a member of the Quartermaster-General's branch of the Staff. All modern armies have a department of supply and transport.

Commission, formal document authorising a person or persons to act in a certain way, perform certain functions, or hold certain offices. Specifically (in Great Britain) a warrant signed by the King conferring a certain naval, military, or Air Force rank upon an individual, entitling him to exercise the authority appropriate to that rank in the Navy, Army, or Air Force. In certain branches of the Civil Service, e.g. in the Inland Revenue, a commission is given to a duly qualified officer. A magistrate holds a commission of the peace. A warship equipped for active service is said to be "put into commission."

The military commission may be said to be derived from the feudal summons of the King to his barons, demanding their attendance and help in home or foreign service. "Commissions of Array" permitted nobles to raise men for particular service and were given also to justices of peace in times of national emergency. Commissions were granted to officers of the National Militia by Lord-Lieutenants of counties until 1872, before which year all commissions, except those in the artillery and engineers, were obtained by purchase. In 1871 the system of examination replaced that of purchase, the military colleges of Woolwich and Sandhurst providing the necessary military education and organisation. Commissions are also available for university and other students who pass the requisite examinations. *See also* RANK.

Commission, Parliamentary, a commission appointed by the King, and formed of Lords Commissioners, which declares the causes of the summoning of Parliament, directs the election of a Speaker to the House of Commons, and signifies the royal assent thereto. Other parliamentary commissions are instituted for the purpose of carrying out specific enquiries, e.g. into an election which is regarded as doubtful.

A *Royal Commission* is appointed by the Crown to enquire into the functioning of existing laws, or to gain information on social or other conditions which may be the subject of future legislation. The terms of reference are specifically laid down and may not be exceeded. Members of a Royal Commission receive no remuneration, but their expenses are defrayed by parliamentary grant. The report of a commission, which may be unanimous, or divided into a majority report and one or more minority reports, may form the basis of subsequent legislation.

Commissionaires, Corps of, an association of ex-soldiers of good character whose members are available for employment on commissions of trust,

to act as messengers porters attendants at buildings and public or private offices etc

Commissioner a person authorised by letters patent Act of Parliament etc. to carry out a public office e.g. to administer the oath to a person making an affidavit For *Commissioner of Assize* see *Court*

Commitment, a warrant directing the person named to be taken to prison either under sentence for crime or contempt of court or for detention pending trial at the Assizes or Quarter Sessions A commitment is the actual decision of the Court to send the person to prison

Committee Originally a body of persons to whom some business was entrusted now a body elected or appointed to deal with specific matters. The Standing Committees of the House of Commons receive discuss amend and report upon all Bills other than money Bills except when these are referred elsewhere Other Parliamentary committees consider special subjects such as railways police Parliamentary privileges public accounts etc (see *Parliament*) The conduct of local government (q.v.) is carried on almost entirely through committees

Committee of Imperial Defence created in 1904 and formerly known as the Committee of National Defence. It is an advisory council composed of the nine principal Cabinet Ministers the chiefs of staff of the three fighting services the Permanent Secretary of the Treasury and any others who may be summoned to attend

Commode, occasional table supported by a cupboard sometimes with drawers also This piece of furniture became very popular in the 18th cent and marble topped specimens with ornaments of metal work are frequent. The term is also used to describe a bedside cupboard

Commodore, appointment of a captain in the British Navy discharging duties rather more important than those appropriate to his rank. Like

Brigadier in the army *Commodore* is not a rank See *RANK*

Commodus, Lucius (A.D. 161-192) Roman emperor succeeded his father Marcus Aurelius 180 Following a conspiracy against him in 183 Commodus became a tyrannical ruler He frequently took part in gladiatorial displays He was put to death in a conspiracy led by his chamberlain Eclactus

Common Law (1) The law of the State as opposed to such foreign laws as may be recognised in its courts (-) Customary law as opposed to Statute Law and by a legal fiction deriving its force from immemorial usage (3) The rules of law as opposed to the principles of natural justice See also *LAW EQUITY*

Commonplace Book, a collection of notes observations and memoranda compiled for the sake of reference or for the recording of the writer's impressions at a particular moment Most of such compilations are in fact commonplace in the sense of being platitudinous and trivial but those of certain eminent men are of interest and value

Common Pleas, Court of, one of the former three Superior Courts of Common Law at Westminster it was an offshoot of the King's Council and dealt with civil actions between subject and subject In 1873 it became a Division of the High Court and in 1890 was merged into the King's Bench Division See *Court*

Common Prayer Book of, the official manual containing the forms for the various prayers rites and ceremonies in use in the Church of England The first Prayer Book issued under Edward VI in 1549 is the direct ancestor of the existing text in numerous respects it represented a closer following of pre-Reformation Catholic custom than did the later editions The first Prayer Book remained in use only 3 years being superseded in 1552 by a new edition which represented a more extreme Protestant point of view This revision was in use for

only a few months, being suppressed on the accession of Mary, who restored the Latin Services

In 1559, a year after the accession of Elizabeth, the Book of Common Prayer was again introduced and used, but it met with disfavour among a certain section of the ministry. Upon Elizabeth's death and the accession of James I in 1603, a conference was convened by the King to discuss the desirability or otherwise of revision. Certain unimportant alterations were made, and the Book remained untouched until 1660.

With the restoration of Charles II, the Nonconformists made representations to the King to the effect that, should the Book of Common Prayer again be brought into use (it was suppressed by Parliament in 1645 for 15 years) changes would be necessary. Certain alterations were made, numbering over 200, but these were generally Catholic in tone. As a protest against these alterations, 2000 Puritan ministers resigned from their benefices.

Certain small alterations were incorporated in 1859, 1871, 1901 and 1922, but the book remains practically the same as the 1662 edition. There has, however, been much agitation to revise the *Book of Common Prayer* during recent years. This has probably been inspired by the general desire to bring the Prayer Book up to the needs of the present day, to revise archaic forms of expression, and to provide for a greater latitude in forms of service, more in accordance with the comprehensive nature of the Church of England. A revised Prayer Book was submitted to Parliament in 1927 and 1928, but it was rejected in June 1928 by 266 votes to 220.

The Prayer Book has followed the Anglican Church into all English-speaking countries, but most lands where there is a large Anglican body—Ireland, Scotland, Canada, S. Africa, the U.S.A.—have produced revisions of their own.

Commons, a right which a man has

in the land of another, deriving its name from the community of interest between the commoner and the owner of the land. There are four kinds: *common of pasture*, the right of feeding one's beasts in another's land, *common of piscary*, the right of fishing, *common of turbary*, a right to dig turf and *common of estovers*, a right to take wood for fuel or repairs. In popular parlance, the term denotes waste land belonging not to any one man, but to the inhabitants generally, over which they have a right of pasture, etc. (see ENCLOSURES)

Commons, House of, see PARLIAMENT

Common Serjeant, an officer of the City of London, who aids the Recorder at the Central Criminal Court, acts as judge of the Mayor's Court and legal adviser and counsel to the City Corporation, and performs certain functions at the election of city officers. The post is a Crown nomination and ranks next to that of the Recorder.

Commonwealth, a form of government in which the citizens have direct voice. It may also denote federation of states, e.g. the Commonwealth of Australia, the British Commonwealth of Nations. In a particular sense the term has been applied to the period between the execution of Charles I in 1649 and the Restoration in 1660.

Commune. Originally a body of citizens in a town possessing a royal charter, to-day a group of persons exercising local self-government under a central authority, especially on the Continent. The word has several special historic applications, notably in the Commune of Paris (1871), when the city, politically estranged from the provinces and faced by the Prussian armies, elected a Socialist republican committee, which ruled locally from March 18 to May 29, when it was forcibly suppressed. The short Communist Régime under Bela Kun in Hungary in 1919 is also known as "the Commune."

Commune of Paris, The, may be termed the first working-class revolution.

lution At the end of the Franco-Prussian War (1870-1) before the terms of peace had been discussed the working men and women of Paris rose in revolt against the Government whom they suspected of intriguing with reactionary forces. On March 18 1871 they seized the city and proclaimed the Commune one of the principal points of their programme being nationalisation of industries. With the assistance of the Prussians however the Commune was overthrown in May of the same year. The Commune was an outstanding historical event and exerted an influence on working-class thought throughout the world.

Communion, Holy the consumption of bread and wine as a religious rite in commemoration of Jesus Christ's Last Supper with His disciples on the eve of His Crucifixion. It is accounted a Sacrament (q.v.) by all Orthodox and Catholic Christians and by all Protestant bodies save those which have rejected the Sacramental conception altogether such as the Society of Friends. Orthodox and Catholics believe that the bread and wine received are changed into the actual Body and Blood of Christ (see TRANSUBSTANTIATION). Lutherans and some other Protestant sects that the Body and Blood of Christ are present together with the bread and wine (*Consubstantiation*). Other Protestants that the bread and wine symbolise or are the vehicles of a spiritual participation in the Body and Blood of Christ.

Communism Although Communist theory may be traced back as far as Plato's *Republic* and the Gospels and its practice to early Christian and later monastic communities its modern form is an outgrowth of industrial Socialism (q.v.) with which it was long synonymous. The primary aim of both movements is now the control of all the machinery of wealth and production by the community and its administration for the common benefit of all. At the outset however the radical opposition between historical com-

munist theory and modern communist practice should be clearly noted. The former imagined every individual enjoying freedom from all government (anarchy) while the latter develops the absolute rule of the State over every activity of the individual. The historical background of this change-over may be briefly traced. Throughout the early part of the 19th cent. Socialist theory was principally in favour of achieving these ends by revolutionary means and culminated in the famous teachings of Marx. When however from the eighties onward orthodox Socialism gradually gained political power and the adherence of intellectual supporters it became more moderate and content to approach its objects by constitutional means through obtaining control of the normal machinery of government. A split ensued and the extremists or anarchist communists who hoped to obtain a state of no-government by the use of revolutionary force were expelled from the Second International in 1896 by the constitutional Socialists and became a small anarchic minority in all countries. In Russia the Socialists themselves being rigorously suppressed remained of necessity revolutionary in their methods and automatically found themselves in the Communist camp though even here smaller factions sought to attain their aims by constitutional means.

Communist thought now developed away from the idea of no-government to that of class government. It held as did the Socialists that communal control of the means of production was necessary but it believed that this was only to be obtained by violent action on the part of the proletariat with the object of destroying the capitalist system which it maintained must inevitably lead to their further misery. All power was to be placed in the hands of the workers who were to form a dictatorship of the proletariat and eventually to achieve a classless society not by the assimilation of all

towards a mean, but by the annihilation of the capitalist and bourgeois classes

On these modified lines the Communists worked in many countries, notably in Germany under Karl Liebknecht as Spartacists, and in Russia as Bolsheviks (who broke away from the Mensheviks or Republican Socialists in 1904)

The confusion and upheaval of the World War, which had split the moderate Second International, brought new adherents and opportunity to the Communists. In Russia the Socialists overthrew the Tsarist Government in 1917, and first the Menshevik Republicans, and in Oct the Bolshevik Communists, took control. Government by Soviets or Workers' Councils rapidly became the normal method of administration, and in the years that followed an attempt was made to organise a completely Communist society. The success of the Russian Communists in obtaining power gave new force to the movement in other countries, and short Communist régimes were precariously maintained in 1919 in Bavaria under Kurt Eisner and in Hungary under Béla Kun, while smaller parties were organised in many other countries. These national parties were joined in the Third (or Communist) International in March 1919.

Meanwhile, Russia became the fountain-head of Communist thought and experiment. Holding with Marx that where there is more than one class, the State is an exploitation by one class of the rest, the Communists aimed at a single-class proletarian society. This they did by crushing all capitalist and bourgeois influence, and concentrating power among the most advanced of the working class, who maintained their rule by force.

This Communist minority, having gained complete control of the State, proceeded according to its programme to nationalise all industry and to attempt the collectivisation of the land. The former aim was carried out without great difficulty, and although Lenin's New Economic Policy of 1923

permitted a considerable amount of private business activity, the disabilities under which the individual trader worked in comparison with the size and resources of State enterprise kept the reactionary movement small.

In agriculture, however, it was difficult to procure the participation of the peasants in collectivisation, and the common reply was a refusal to grow and supply the grain necessary for the towns. Acute famine threatened several times, and a more gradual policy of collectivisation and of large-scale State farming was embarked upon.

Not only industry, but also banking and foreign trade, were retained exclusively in the hands of the State, and these two latter weapons proved decisive in the maintenance of control. In 1928 a vast project of industrialisation and large-scale State farming, called the Five-year Plan (*q.v.*), was embarked upon, partially with the object of making the State independent of foreign trade and peasant-farmer. It was completed in 1932, although very far short of the schedule. A second supplementary Five-year Plan began in the following year.

In theory the administration of the U.S.S.R. by a series of Soviets or councils, from local to national, independent of the Communist Party. So far it seems as though the system can only work efficiently with a strong and all-powerful Communist dictatorship at the head. The pendulum has swung to the farthest extreme. From an advocacy of no-government, Communism has at last reached the state of absolute dictatorial State-control.

The Third International maintains its headquarters at Moscow, and engages in revolutionary propaganda through its affiliated groups in all countries. Its influence is, quite naturally, greater in time of hardship, depression, and unrest, less in time of prosperity. Pursuing an anti-imperialist policy, its activities are particularly noteworthy in the countries of the Middle and Far East which about

on to Russian territory Nevertheless at the time of writing (1933) no country besides Russia and a part of China appears within measurable distance of a Communist régime

The Russian Communist Party proper numbers only 1½ millions with perhaps another 1½ million Young Communists

CONSULT Karl Marx *Capital* (Eng trans E and C. Paul) Marx and Engels *The Communist Manifesto* N Lenin *Collected Works* (in progress)

Como (1) Italian lake in Lombardy a famous beauty-spot and holiday resort Its area is 55 sq m The R. Adda flows in at the N and out from the S In places the lake is extremely deep and is subject to sudden and violent storms Its beauties were well known to the Romans who built a number of villas on its shores (2) Italian city Lombardy in the department of Como at the S end of the lake on the site of the Roman city of Comum. There are several 11th cent. churches and a fine marble cathedral dating from the 14th and 15th cents There are several local industries of which silk and velvet are notable and the city stands in an agricultural district producing olives oranges and other fruit The Roman town parts of which have been revealed by excavation was the birth place of both the Plinys Pop of town 38 000 Area of dept 800 sq m pop 5* 700

Comoria, Cape, the most S point of India, a low extension of the W Ghats

Comoro Islands, French group lying between N Madagascar and the African mainland There are a number of minor islands but the four of any importance are Great Comoro Anjouan, Mayotte and Moheli The islands form a province of Madagascar and are administered since 191 by a local Governor The surface is mountainous and volcanic highest m Great Comoro is 8500 ft. high The islands produce good crops of sugar vanilla, coffee etc. Large flocks of cattle and

sheep are raised Turtles abound and copra and sugar-cane are important products The chief towns are Maroni, Mossamodu and Msapéré Most of the natives are Mohammedans The area is c 900 sq m pop (1931) 130 000

Companies, Chartered *see* COMPANY JOINT STOCK

Companies City or Livery A survival of the mediæval craft guild system in the form of societies and corporate bodies existing in the City of London Members of the companies originally wore elaborate costume uniform or livery At first formed for the regulation of trade and production they accumulated large endowments which are now mainly devoted to technical education and charity There are 78 City Companies remaining nearly 40 with their own halls The 1 most important in order of civic precedence are

	N of Livery	Total Income £	Hall
Mercers	235	111 000	4 Ironmonger Lane E.C.3
Grocers	118	38 000	Princes St. E.C.2
Drapers	180	78 000	Throgmorton St. E.C.3
Fashmongers	273	90 728	London Bridge E.C.4
Goldsmiths	250	6. 000	Foster Lane E.C.2
Skinners	197	66,700	Dowgate Hill E.C.4
Merchant Tailors	329	80 000	30 Threadneedle St. E.C.3
H. berrishers	33	6 000	23 Gresham St. E.C.3
Salters	146	22 000	St. Swinbo Lane E.C.4
Ironmongers	31	28 000	Shaftesbury Pl Ald r gat E.C.1
Vintners	201	27 300	Upper Thames St., E.C.4
Clothworkers	168	84,467	61 Mining Lane, E.C.3.

Company Joint Stock, method of financing enterprise by public subscription of capital in stock or shares of limited amount, rewarded by a proportionate division of profits. The Chartered Companies of the 17th cent.—the East India Com

pany (1600), the Bank of England (1694), the Hudson's Bay Company, for example—received authority and exclusive trading rights from the Crown, and, though individual members could not be made responsible for the debts of the company, had complete independence in working.

A new form of company grew up at the end of the century with transferable shares, and not incorporated. An Act of 1719, following the notorious South Sea Bubble, endeavoured to suppress these as fraudulent, but, failing in its object, was repealed in 1825, when the aggregate capital of joint-stock companies was already estimated at £200 millions. The enormous industrial expansion of the early 19th cent was financed increasingly by Joint-Stock Companies, and in the railway boom of the eighteen-forties such huge sums were raised (over £5 millions by the Midland Railway) that some permanent legal status became necessary. In 1834 they had received the right of suing and being sued as companies, in 1844 provision was made for registration and incorporation, and in 1855 the principle of limited liability was finally settled, whereby the liability of the members for the debts of the company does not extend beyond the amount of their share-holdings.

In the United States, the joint-stock company has little legal status, is uncontrolled except by the individual States, and its place is largely taken by the corporation (*q v*).

The private company allows provision for private control, without the publicity involved by corporations. Public subscription is disallowed, the negotiation of shares restricted, and the number of stockholders must not be less than 2 or more than 50. A similar arrangement, the *GmbH* (*Gesellschaft mit beschränkter Haftung*), is permitted in Germany.

Enormous sums are raised yearly on the Stock Exchanges of the world for the flotation of new companies, the average rate of interest guaranteed

depending upon the amount of competition for available money and the security of the company concerned. In 1930 there were in Great Britain and Northern Ireland 113,000 joint-stock companies with a paid-up capital of £5,534 millions.

Company Promoter, a person or firm engaged in the business of forming and launching new companies. The work consists in drawing up the articles of association, finding directors, advertising, and issuing shares to the public.

Company-promotion is fairly profitable, especially at a time when the public is eager for new opportunities to invest in speculative undertakings, but since the promoters usually cease to take interest in a company once it is formed, a good many companies have been fraudulently floated which involved investors in severe losses. The term "Company Promoter" has for this reason come to carry a good deal of opprobrium, but there are a number of reputable firms and individuals engaged in the business, and in so far as they assist sound and profitable ventures at their inception, they perform a useful function. There is no hard-and-fast line between a company promoter and an issuing house (*q v*).

Compass, Mariners', a device which enables the direction of the earth's poles to be found without observation of the heavens. Two principles are used in the construction of such instruments, one depending on the earth's magnetic field, and the other upon the rotation of the earth upon its axis. The latter principle has only quite recently been successfully applied to practical construction, but the fact that a pivoted magnetic needle or other magnetised body will point in a direction approximately N and S has been known from very early times. It was at one time believed that the Chinese were in possession of this invention as long ago as 2600 B.C., but no authentic Chinese record is known of earlier date than the end of the 13th

cent A.D. A great deal of conjecture concerning the early use of the compass by the Arabs does not rest upon any authentic information earlier in date than the description given by an English writer Alexander Mackam in the 14th century. From this period onward we have a number of clear descriptions of the magnetic compass consisting of a pivoted needle or one floated on water by means of a piece of wood or cork.

Lord Kelvin was responsible for the design of the *drycard compass* still very largely used. It has a circular disc which is graduated in angles and points and is formed by a paper disc mounted on an aluminium ring in the centre of which is a disc of aluminium held by silk threads and carrying a pivot and a number of magnetised needles. The card is mounted in a bowl which is pivoted on gimbals. The drycard compass is being superseded by the *pan or liquid compass* having a mica disc which nearly floats in a mixture of alcohol and water. The construction is similar to that of the drycard compass but the bowl is filled with liquid and hermetically sealed. The liquid damps oscillation and only a liquid compass can be used on a small boat at sea where the motion prevents a drycard from remaining steady. On a ship the compass is mounted in a pedestal called a *binnacle* which is provided with a lamp for illuminating it at night. On the bowl is a vertical black mark called the *lubbers line*, the compass being mounted so that a line drawn through the lubbers line and the pivot is parallel to the ship's keel. The ship's magnetic course is therefore indicated by the point on the card which meets the lubbers line. Since the iron contained in the ship affects the compass compensation is necessary by the use of permanent magnets and soft iron fixed in the binnacle. Every care is taken to see that this compensation is and continues correct the ship being swung that is to say pointed in all directions in turn the compass read-

ings being observed from point to point. The actual process of testing and correcting is much more complicated than might be expected for the fact that the ship contains both permanent and induced *magnetism* (*qv*) must be taken into account.

Compasses for aircraft are of two types a modification of the liquid compass known as the *aperiodic compass* and still less susceptible to vibration and rapid motion and the *earth inductor compass* described under **AERIAL NAVIGATION**. The airman also uses the twin indicator a pivoted gyroscope which may be regarded as a transition to the gyroscopic compass.



Compass.

Apart from disturbance by the iron and steel of the ship the magnetic compass suffers from the drawback that the earth's magnetic field is far from being everywhere N and S in direction either with reference to the geographical poles or the so-called magnetic poles. The course must therefore always be corrected for the local *declination* that is the angle between the magnetic meridian and the true meridian by reference to the chart. This angle varies both slowly and progressively over years and centuries and rapidly during magnetic storms. In certain places the earth's magnetic field is greatly distorted.

the presence of deposits of magnetic material. For these reasons the gyro-compass (see *GYROSTAT*) is rapidly superseding the magnetic compass for use on ships. It consists of a heavy wheel which rotates very rapidly, and so supported that the rotation of the earth causes it to set itself true N and S. It requires the very highest degree of mechanical skill and precision in its construction, for the gyrostat revolves at no less a speed than 20,000 revolutions per minute, and it is, therefore, expensive and quite unportable. The magnetic compass therefore retains its value on sea and land for small craft, or exploration, and for surveying.

Compasses, instrument used for drawing circles, or, in the form known as dividers, for comparing lengths with a scale or marking off from a scale. It consists of two rods pivoted together at one end and carrying at the other either two points, or one point and a pen or pencil. The *beam compass*, used when the lengths to be measured or the circle to be drawn are large, consists of a straight flat bar provided with blocks sliding upon it, carrying sharp points, or one point and a pen or pencil, and capable of being clamped by screws to the bar.

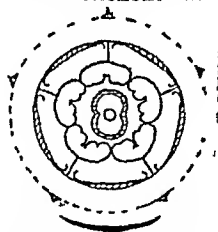
Compensated Dollar, a system of managed currency, put forward in America by Prof Irving Fisher, by which the gold value of the dollar would be varied to keep its purchasing power always constant. With a fixed gold value, the amount of goods which the dollar can buy will vary according to (a) the supply and price of gold, and (b) the amount of goods available. This fluctuation is extremely inconvenient, one of the causes of the trade cycle, with its booms and depressions and their attendant evils. Prof Fisher's compensated dollar would involve that, instead of gold being fixed and commodities variable in relation to money, commodities would be fixed and gold variable.

Competition (econ.), the economic system which allows of the free entrance and action of individual enter-

prise in all branches of trade and industry. It is held to achieve in the most natural manner the equilibrium between supply and demand, and is contrasted with monopoly, or unified capitalist control over a certain field, and with socialisation, or national ownership of all means of production. The entirely free play of competition was advocated in early industrial days by the *laissez-faire* school, but has since been somewhat modified by the advantages obtained from amalgamation and large-scale organisation. See also **COMBINES**, **INDUSTRIAL ORGANISATION**.

Compiègne, historic French town, in Department Oise, 50 m NNE of Paris, noted for its fine park and general holiday amenities. It stands on the R Oise. Pop 17,360.

Composite Family (bot.). The *Compositae* form the largest family of the vegetable kingdom, comprising some 12,000 species, mostly herbs, and spread over the whole world. Lettuce, endive, chicory, and artichoke are economically valuable, dahlia, aster, chrysanthemum, sunflower, coreopsis, and gaillardia are garden plants, and the dandelion and daisy are common wild flowers belonging to this family.



Compositae (Floral Diagram)

The dandelion, which is such a persistent weed, has a well-developed tap root which has great regenerative powers so that even a small piece of it left in the ground produces a new plant. A large number of flowers is produced in each capitulum, with a mechanism whereby self-pollination is ensured should cross-pollination fail, the style pushes up through the ring of stamens and spreads its ripe stigmas to receive pollen brought by insects from another flower, the stamens ripen, and shed their pollen later. The stigmas then curl downwards and back

on themselves to touch the style on which are scattered pollen grains from the stamens to the same flower. Pollination takes place even if the flowers never open, and from every flower one seed is formed. After fertilisation the ovule matures rapidly and in the dandelion and in many other composites a feathery pappus develops by which the fruit is dispersed on air currents.

The family is of great theoretical interest because of these mechanisms and of its being the highest evolved family of flowering plants also because of the system of latex tubes in the group within the order a striking example of homoplasy or parallel development with the spurge and poppy families.

Composites Order in architecture denotes a form wherein the Ionic (I.) and Corinthian (C.) designs for the capitals of columns are blended.

Composition see **MIXTURE**.
Compost, a mixture of manures or arths and manures varying in proportions and quality to suit different plants. If leaves are required to be largely developed the compost can hardly be too rich for the greater the quantity of food imbibed by the roots the greater will be the surface of leaves required for its elaboration. But if flowers and fruit as well as leaves are desired the compost if excessively rich will cause them to diminish in number and size and the flower buds to pass into leaf buds.

Composts must also regulate the amount of moisture supplied to the roots totally independent of drainage as compost retains moisture by its chemical and capillary powers. The richer in decomposing animal and vegetable matter and the looser its texture the better does a compost retain moisture and this power is diminished in proportion as siliceous sand or chalky matter preponderates. Compost is usually best when prepared from strong tenacious loam half rotten leaf mould half soil horse manure cow manure charcoal and

wood ashes bon dust sharp sand burnt turf and well-scaled moss.

Compound (chem.) a substance composed of two or more elements and arising from a mixture in that these are present in a constant proportion no matter how or where the compound is prepared. See also **CHEMISTRY**.

Compressed Air. The use of air under pressure is of all kinds of purposes is continually increasing in spite of the fact that as a means of transmitting power it is exceedingly inefficient (see **GASES PHYSICAL PROPERTIES OF**).

As a source of power compressed air is mainly used for small *reciprocating* tools such as rock drills riveters and breakers chipping chisels and tools for cleaning boilers and dressing surfaces. It is also largely used in connection with *automatic* and *semi-automatic machinery* in which motions are required at intervals this is especially useful when such motions are liable to meet with resistance which would lead to damage if they were performed by non-yielding machine parts. The compressed-air brake is largely used on railways. Another important field for compressed air is *pneumatic dispatch tubes* through which cylindrical cases containing letters etc. are blown.

An important development in the use of compressed air consists in its use for *spraying paint and varishes* upon surfaces. This method of painting which is very much more economical in labour than in material has received more and more attention since the development of cellulose varnish (see **PAINTS AND VARNISHES**) though it is by no means a recent invention. It is now applied to every kind of paint, including distemper whitewash and bituminous paint and effects an enormous saving in labour while the results are in most cases equal to brush work. Small electrically driven hand plants for this purpose are now available.

Sand blasting the use of a powerful jet of sand formed by air under pressure is very greatly used for the pur-

pose of cleaning castings, dressing stone, frosting glass, and cleaning scale and rust from metal surfaces. It frequently also greatly hardens the surface, the effect produced being similar to that of cold rolling.

In tunnelling, especially in soft ground, it is necessary for the work to be carried on under considerable pressure, and the workers are able to maintain good health and working efficiency, so long as the release of pressure is accomplished sufficiently slowly. If pressure is released quickly the nitrogen dissolved in the blood under high pressure is released in the form of gas, arrests the circulation of the blood in the capillary blood-vessels, and also produces nervous disturbances. This is known as caisson disease, and its avoidance is only possible by releasing the pressure slowly, when the nitrogen is evolved through the lungs.

Compton, Fay (b 1894), English actress, made her début at the Albert Hall in a Christmas play, 1906, and on the regular stage in 1911 with *The Folies* at the Apollo. Her numerous successes include performances in *Peter Pan*, *Mary Rose*, *Romeo and Juliet*, *Autumn Crocus*, and *Once a Husband*. She took up film work in 1928, and has appeared in *Fashions in Love*, *A Bill of Divorcement*, *Tell England*, etc.

Compton Effect, the experimental proof by A. H. Compton in 1923 that X-rays, scattered by falling on a solid such as carbon, are altered in frequency. The scattered rays were found to be of two kinds, one having the same frequency as the original X-rays, the other a less frequency. If X-rays consist of single "photons" or corpuscles similar in size to electrons, but moving with the speed of light, and are scattered by colliding with the electrons, the Compton effect can be exactly calculated. This experiment thus affords proof that light must be at once wave-like and particle-like in nature (see QUANTUM THEORY).

Compulsory Service, see CONSCRIPTION.

Compurgation, ancient form of pro-

cedure in criminal cases whereby a prisoner succeeded if he could find a sufficient number of people, depending on the gravity of the charge, to swear to his innocence. See also JURY.

Comte, Auguste (1798-1857), French philosopher. Largely influenced by Saint-Simon from 1818, in 1826 he began a course of lectures which attracted some of the most famous men of his day. After the third lecture he was seized with an attack of mental derangement and attempted suicide, but after about a year his reason was restored and he began his active work again, securing an appointment as examiner to provincial schools. J. S. Mill was corresponding with Comte before 1842, and Mill's *System of Logic* owes much to Comte's influence, later, when the Frenchman had offended important people and lost his income, Mill raised a subscription for him in England.

The whole of Comte's teaching, known as *Positivism*, insists that a moral transformation is necessary before any real advance can be made, and that altruism must conquer on every plane of life. He would elevate humanity to the throne of the divine and make man inhuman, but he has added greatly to the field of thought, and the matter of his writings, including *Catéchisme positiviste* (1852) and *Cours de philosophie positive* (1830-42), is of sufficient interest and importance to defeat the narcotic effect of his style.

Comus [kō'mūs], Greek god of festivity. He was the chief figure in Milton's masque of that name.

Concealment of Birth, see BIRTH.

Concepción. (1) S. province of Chile. The surface consists of the lower slopes of the Andes in the E., sloping into great plains in the W. and centre. An important cattle-raising district, the region is extremely fertile, and produces large quantities of wheat, wine, and timber. There are good coal deposits near the coast. Industries include wool, flour-milling, and mining. Chief towns are Talcahuano and Concepción, the capital, an important

trading and manufacturing centre which has several times been damaged by earthquakes. Distilling, brewing and flour milling are carried on. Area of province 4 400 sq m. pop. province (1930) 3 9500. town (1930) 77 600. (?) A busy river port of Paraguay on the Paraguay R. The surrounding regions are largely infertile and the only notable local export is Paraguay tea. Pop. 11 000, many of whom are Indians.

Conception see **REPRODUCTIVE SYSTEM**

Concert, a form of musical entertainment known in England in the mid 17th cent. which grew to popularity early in the 18th cent. when London became a city where the world's finest musicians could be heard. One famous concert hall was the St James's where many favourite artists of the 19th cent. such as Joachim, Patti and Sarasate were frequently heard. After the demolition of St James's Hall (1903) the principal orchestral concerts including the pre-annual *Promenades* have been given at the Queen's Hall, while celebrities are more often heard in the huge Albert Hall at Kensington. Concerts on an enormous scale are popular to-day in the U.S.A. where there are many great auditoriums including the famous open air Hollywood Bowl.

Concertina, a free reed pneumatic instrument invented by Wheatstone in 1829. It is of hexagonal shape, has a keyboard at either end and is operated by the action of a bellows on the reeds. It has a range of over 3 octaves.

Concert of Europe the name given to the attempts made during the 19th cent. to settle the affairs of Europe by common action on the part of the Great Powers. The second Treaty of Paris in 1815 renewing the alliance between Russia, Prussia, Austria and Great Britain, laid down that representatives of these Powers should meet periodically to discuss matters of interest to all. Meetings were held at the Congress of Aix-la-Chapelle (1792) in

1818 Troppau in 1820 (qv) and Verona in 1822 (qv). This system of periodic meetings was broken up by Canning (qv) British Foreign Minister who refused to attend one summoned at St. Peterburg in 1844. The main point of difference was over the right of the Great Powers to interfere in the internal affairs of States.

The system of settling matters of common interest by conference went on each conference being summoned *ad hoc* e.g. the Congresses of Berlin in 1878 to settle the Balkan Question and in 1896 to settle certain African questions. The Concert of Europe ceased to exist on the formation of the Triple Alliance and the Triple Entente. Its place has to some extent been taken by the Conference of Ambassadors working side by side with the League of Nations. This has been concerned among other things with the Vilna dispute (1920) and with the Italo-Greek Conflict (1923).

Conciliation, the settlement of a dispute by reference to a commission which makes a report but does not give an award or judgment. The Ministry of Labour is empowered to appoint conciliators for dispute between workmen and employers and to register conciliation boards for a similar purpose.

Conclave (1) The assembly of Cardinals which takes place immediately after the death of a Pope for the purpose of electing his successor. It is attended by all the Cardinals resident in Rome and such of the foreign Cardinals as can reach the city within a stated interval of fifteen to eighteen days. On the assembly of the conclave the Cardinals are secluded from the outside world until the election is over. Each is allotted a suite of rooms and all meet three times daily in the Sistine Chapel to ballot for the new Pope. Ballots are repeated until one candidate secures the suffrages of two-thirds of those present whereupon—subject to acceptance by him—he becomes Pope and is

as soon as possible after the election

(2) Any private council meeting

Concord: (1) State capital of New Hampshire, U S A, on the R Merrimac some distance inland. Printing and publishing, textiles, and granite quarrying are the most important industries. There is a municipal airport. The State capitol is a striking edifice. The town has been capital of New Hampshire since 1808. Count Rumford, the scientist, and Mrs Eddy, the apostle of Christian Science, were born here. Pop (1930) 25,200. (2) Small town in Middlesex county (Massachusetts) in picturesque surroundings. It was an early centre of the colonial resistance to England, and an expedition dispatched to seize arms here led to the British reverse at Lexington (1775). Concord was the residence of R W Emerson, H D Thoreau, and Nathaniel Hawthorne. Pop c 7500.

Concordance, as a literary term, is applied to an alphabetical list of words occurring in a particular book or used by a particular author, giving references to the places where they occur. The most famous example is the concordance to the Bible originally compiled by Alexander Cruden (1st ed 1737), and other Biblical concordances are those of Young and Strong. Concordances have been compiled for the works of many authors, such as Homer, Vergil, Shakespeare, Shelley, and others.

Concordat [*pron* KONKOR'DAT] Originally any pact or agreement, later one between ecclesiastical and secular authorities, and especially between the Pope and a temporal ruler concerning ecclesiastical matters within the latter's domains. A concordat may take the form of a papal bull incorporated into the legislation of the country, simultaneous and identical Acts signed by the Pope and the sovereign, or a mutually signed treaty. The first English concordat was concluded by Henry II in 1107. Many Continental concordats occur through the Middle Ages and up to the

19th cent., among the most recent being those incorporated in the Lateran Treaty signed by the Pope and Signor Mussolini on behalf of Italy in 1929, and the concordat between Nazi Germany and the Holy See signed in July 1933. Perhaps the most famous of mediæval concordats was that of Worms (1122), which settled the question of investitures.

Concrete, a composite material made of broken stone or brick fragments, sand, and gravel united by a binding agent, such as cement or lime, and mixed with water. Sometimes metal is embedded in "reinforced" concrete to give it additional strength. The matrix nowadays is usually Portland cement. Concrete is used in great quantities for many purposes, most widely for the foundations of houses. Every building in London which is not on a natural bed of gravel must have a concrete bed at least 9 in thick. The proportion of cement to other material is c 1 part in 8 for this type of concrete. Another great use for concrete is in breakwaters and dock walls. Bags of concrete are often lowered into the sea, and the bottom bag, still plastic, adapts itself to the sea floor, sometimes the concrete is moulded into blocks and laid in position with cranes. A third way of constructing a concrete wall is by filling a wooden framework with concrete. Iron caissons were employed in this way at Zeebrugge to cast huge blocks. Concrete was used for many purposes in the World War, and its value as a building material was proved, so that, after the War, it came to be used for houses.

Reinforced concrete is also known as armoured concrete and ferro-concrete. The strengthening metal is generally steel in the form of bars at definite distances apart in the concrete and connected by cross-bars. The ingredients are well mixed dry and again after wetting, and the concrete is placed in position before it begins to set, and is compressed into the moulds to ensure compactness. It is protected against getting too dry by wet sacking.

or by watering. It cannot be laid in temperatures below 39 °F and frozen concrete is useless. The object of the steel is to resist the tensile and shearing stresses to which concrete is a relatively poor resister. The concrete is thoroughly mixed by machinery and poured into wooden moulds in the position it is required to occupy. The moulds are removed when it has set. The steel rods are added while the concrete is in the mould. Reinforced concrete walls can be much thinner than brickwork and are more plastic during construction. They are resistant to fire and impermeable to water and are not affected by vibration. Reinforced concrete is a favourite building material for warehouses, bridges, light houses, docks etc. and for weight bearing, fire resisting floors. The General Post Office is built of reinforced concrete. The appearance of such buildings can be improved by facing with stone.

Concretion, a collection of mineral material derived either from the surrounding rock or from water percolating through it round a centre so as to form a nodule. Generally the centre of deposition is organic, a shell, fish bone etc. The most frequent minerals to form concretions are calc. pyrites and calcite. A concretion may form a *beetle stone* due to water percolating to the centre through cracks dissolving the nucleus and laying down some mineral in its place and also in the cracks of entry, the effect resembling the body and extended legs of a beetle. In a true concretion the central material is deposited first and the nodule grows by addition of layers from without. See also **SECRETION**.

Concussion see **CONA**.

Condé (from **KONDÉ**) Louis II de Bourbon, Prince de (1611-1686) the great Condé, French general. As Duc d'Enghien he defeated the Spanish at Rocroy 1643 thus establishing the period of French ascendancy. With Turenne he repulsed the Imperial forces 1644-8. He became prince 1646 and was now the most

powerful noble in France. He supported the regent Anne against the Fronde 1649 but was arrested 1650. His wife aided by the new Fronde, forced Anne to release him and he fought first for the insurgents and then for the Spaniards till the peace of 1659 when Louis XIV pardoned him. He failed in his claim to the Polish throne but led the French to victory against William of Orange 1674 and against the Imperial general Montecucculi 1679. He devoted his last years to literature and religion.

Condenser Electrical. The electrical condenser consists of two conductors of considerable area so arranged as to have a comparatively large electrical capacity (see **ELECTRICITY**). The word large is purely relative as compared with the circuits and conditions under which the condenser is used. The earliest condenser was the Leyden jar discovered in 1745 by von Kleist and independently discovered 3 months later at the University of Leyden. The form common until quite recently consisting of a glass vessel coated inside and out with tin foil to within an inch or two of the top was very soon developed. Glass, however, is not a satisfactory dielectric, since on account of its attraction for moisture it is not a good insulator.

Modern condensers are chiefly of two kinds: those with a high capacity consisting of very thin metal foil separated by solid dielectric and those with a low capacity consisting of metal plates separated by air. The latter type is generally made to be variable, the plates taking the form of two sets of parallel sectors or vanes, one set of which can be rotated so as to enter more or less deeply the spaces between the other set. The capacity of a condenser with a solid dielectric depends upon the *dielectric constant* (see **SPECIFIC DIELECTRIC CAPACITY**) of the latter but more important from a practical point of view is its *dielectric loss* and *dielectric strength*.

The use of condensers apart from wireless telegraphy and telephony is continually increasing. They

regularly used, e.g., to improve the power factor of alternating-current installations. Very large capacities in very small space are given by *electrolytic condensers*, in which use is made of the fact that aluminium and various other metals will not pass current when used as the positive electrode or anode in an electrolytic cell. Two aluminium plates dipping in a suitable electrolyte will therefore not pass an alternating current, but they form a condenser of very large capacity. Such condensers are chiefly used for smoothing sources of voltage. See also ELECTRICITY, WIRELESS.

Condenser, Thermal, an apparatus employed to cool a vapour so as to cause it to condense to a liquid. Condensers are chiefly used in connection with the distillation of liquids, and with engines driven by steam and other vapours. The vapour to be condensed is passed either through tubes cooled outside by water or other means, or through a vessel filled with tubes through which cooling water is circulated, the latter form is called a *surface condenser*. The simplest form of condenser largely used in chemical laboratories is known as *Liebig's* (Fig 1). A glass surface condenser is also much used in the laboratory (Fig 2).

The application of the condenser to

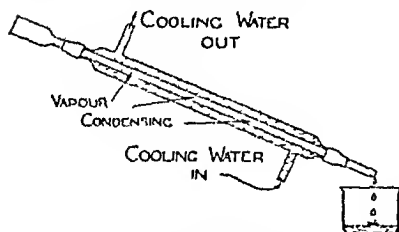


FIG 1—Liebig's Condenser

the steam-engine by James Watt in 1769 was one of the greatest events in modern industrial development. In previous steam-engines, steam had been admitted to the cylinder when the piston was at the top of its stroke, and condensed by a jet of water forced into the cylinder, whereby the piston was pressed down by the pressure of the atmosphere. This resulted in an enormous loss of heat, since the cylinder

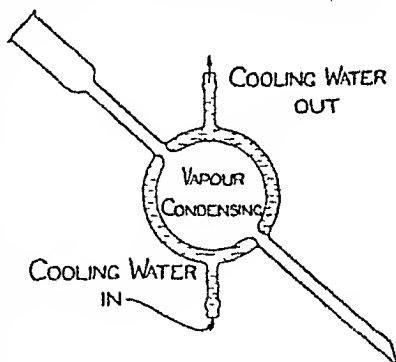


FIG 2—Surface Condenser

was cooled every time. Watt realised that the steam could be condensed in a separate vessel if no air were present, he therefore added this vessel in connection with the cylinder and an air-pump, but retained low-pressure working, whereby the engine is driven by atmospheric pressure, and not by the expansive force of the steam. In the modern steam-engine the latter is the main driving force, and the steam may be exhausted to the atmosphere without condensation, as is done in locomotives. But for stationary engines great increase in efficiency is obtainable by using an air-pump and condenser. For steam-engines a *jet condenser* is frequently employed, in which the steam is condensed by direct contact with a jet of cold water. See also STEAM-ENGINE, CHEMICAL ENGINEERING.

Conder, Charles (1868-1909), English painter, best known for his charming designs for fans. He is the leading English "petit maitre," and is represented at the Tate Gallery by water-colours on silk, oil paintings, etc.

Conditioned Reflex, see COMPARATIVE PSYCHOLOGY.

Condominium, territory adminis-

the steam-engine by James Watt in 1769 was one of the greatest events in modern industrial development. In previous steam-engines, steam had been admitted to the cylinder when the piston was at the top of its stroke, and con-

tered by two or more Powers jointly. Examples are Tangiers administered by Great Britain, France, Spain, Italy, and the Sultan of Morocco, and the Anglo-Egyptian Sudan administered by Great Britain and Egypt.

Condonation see **MARRIAGE**

Condor, the largest of the vultures (*q.v.*) is found in S. America principally in the Andes up to about 18,000 ft. In colour it is mostly black with some grey on the wings and a collar of white down on the neck. The male bird has a large wattle or crest like a cock's.



Condor

comb on the forehead and base of the beak. The wing span is about 9 ft. Like other vultures, condors feed mostly upon dead animals, but they also attack and kill young or decrepit horses, cattle, sheep, and goats.

Condorcet, (Marie Jean Antoine Nicolas Caritat) Marquis de (1743-1794), French philosopher and mathematician, early distinguished himself as a scientist and entered the Académie des Sciences in 1769. He helped to prepare the *Encyclopédie* and published an important work on the theory of probabilities (1785, reprinted 1801) and biographies of Voltaire and Turgot (1786-7). He became prominent among the revolutionaries after 1789 and took part in the declaring of the Re-

public and the drawing up of the address to the European Powers. He was a moderate, however, and at the beginning of the Reign of Terror was outlawed. He fled but was captured and imprisoned and was found dead in his dungeon. His last work was the *Esquisse d'un tableau historique des progrès de l'esprit humain* (published posthumously), the chief of his philosophical writings. His wife (d. 1821), a sister of Marshal Crémier, was also a philosophical writer and kept a *salon* famous both before and after the Revolution.

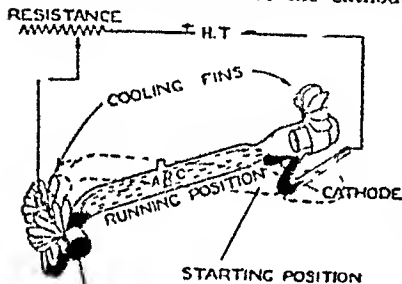
Condottieri, Italian name for mercenary soldiers, many of whom were hired during the wars between Italian States of the 13th-15th cents. They gained great power and contributed largely to the low financial and moral state of Italy during that period. Chief among these armies were those led by Montecatini d'Albino and Conrad Lando (these were mostly Germans) and Sir John Hawkwood, who commanded an English mercenary band. The armies grew gradually to be attached to certain States and thus obtained a semi-national status, chief among the leaders of this latter period were the Strozzi and Carmagnola. The soldiers, the majority of whom were cavalry men, kept to a strict disciplinary system but were permitted to indulge all their lusts at the expense of the peasants and defeated States.

Condouris, Paul (b. 1855), Greek statesman, entered the Navy and served in the Greco-Turkish (1897) and Balkan (1912-13) Wars. In 1916 he joined the Provisional Government of Venizelos (*q.v.*) and was Minister of Marine from 1917 to 1919. He retired until 1933 when, on the deposition of George II, he was made regent and in 1934 President of the Greek republic. This post he retained until 1939 except for a short interval in 1936.

Conduction of Electricity through Gases. In a glass tube containing a gas and provided with two electrodes between which a high electric potential difference is maintained, no discharge

by a very high voltage acting over this path will not find enough gas upon which to act

Just as cathode rays constitute a stream of negative particles, so it has been possible to produce, isolate and investigate a stream of positively charged particles, called *canal rays*. Their study has led to the most important discovery of *isotopes* (*qv*). In the diagram the cathode consists of a block of aluminium bored with a long hole or "canal" along the axis. The tube is exhausted to a fairly low vacuum and contains helium. The cathode rays are emitted to the left in the diagram, and the positive rays formed on the left-hand surface of the cathode



ANODE (MERCURY)

Fig 7—Arc formed between Mercury Surfaces
Contact obtained by Tilting

shoot through the canal and appear as a beam in the right-hand bulb. A magnet which will deflect the cathode beam produces hardly any effect upon the canal rays, for these are made up of very much heavier particles of a similar charge and travelling at high speed, though not so high as those of the cathode rays.

These canal rays consist of atoms of such elements as are available in the tube, possessing positive charges equal and opposite to one or more electrons, and moving at various velocities. When they are exposed to the deflecting effects of electric and magnetic fields they can be sorted into rays of atoms of different mass. After much work had been done on this sub-

ject by Thomson, Aston devised an apparatus, which he called a mass spectrograph, which split up the beam of canal rays and brought each kind of atom present to a focus on a photographic film, on which it produced a black line, just as the rays of light of different wave-lengths are focused on a plate in the ordinary spectrograph (see SPECTRUM ANALYSIS). From the position of these lines the masses of the atoms could be calculated, and it was thus possible to prove that practically all atoms have masses which are whole numbers, taking oxygen as 16. Since the atomic weights of the elements are, with a few exceptions, not whole numbers, they can only be mixtures of atoms of different mass. It was found for instance, that chlorine gas (atomic weight 35.46) is a mixture of two kinds of atom, having identical chemical properties, of masses 35 and 37. These can be separated by diffusion.

Coney, or Cony, is a nearly obsolete name for the rabbit. The cony of Scripture is the animal known to zoologists as the *Hyrax* (*qv*).

Coney Island, popular seaside resort and centre of entertainment in the U.S.A., off Long Island, 11 m. from New York. It is included in the borough of Brooklyn, New York City.

Confectionery, a large range of sweet luxury foods, including all kinds of "sweets," crystallised fruits, jam and jellies, and "fancy" cakes. The main ingredients are sugars of various types (see SUGAR, GLUCOSE, INVERT SUGAR). Fats, such as butter, margarine, lard, and various oils (see OILS AND FATS), eggs (*qv*) and substitutes are also used, as well as starch in various forms, e.g. flour, potato starch, arrowroot, etc., fruits and spices, milk, and various flavouring materials, such as cocoa (*qv*), almonds, extracts of all kinds, and, finally, colouring matter, such as caramel and vegetable extracts, and synthetic dyes.

The making of cream-filling is the basis of a large number of sweets. Hard sweets, and fondants (*qv*), de-

Confederate States

19

Confirmation

end upon the use of sugar boiled to various degrees. In this process cane or beet sugar is melted with about one third its weight of water and certain substances which retard crystallization or rather cause the sugar to crystallise in very fine crystals. These most commonly used are glucose, cream of tartar, acetic acid and lemon juice. The sugar starts to boil at about 15 F and can be heated to about 15 F without burning. The degrees of boiling are known as *smooth* (215-30-235 F for liqueurs), the *thread* (30-235 F for liqueurs), the *soft* (40-45 F for soups), the *ball* degree (250-255 F for grained goods), the *crack* degree (10-315 F for hard toffee pulled and spun sugar etc). At this temperature the sugar begins to change to caramel. The sugar is tested by hand, using only at the smooth degree forming threads at the thread degree being capable of forming a ball between the fingers when further heated and finally sticking at the highest degree. Fondant forms the basis not only of various sweets but of the icing of cakes. All kinds of toffees and boiled sweets are made by boiling to the crack degree butter or butter substitutes forming an ingredient of some of them.

Modern factories have apparatus which boils sugar automatically and continuously to the required degrees, moulds and coats the sweets and reduces handling and hand transport by use of belt conveyors. Chemists are employed to supervise the purity and composition of the ingredients employed. See David Ellis and Dugald Campbell *The Science and Practice of Confectionery* (London 1928).

Confederate States, strictly Confederate States of America title of the Southern States (Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Texas and Virginia) that seceded from the U.S.A. in 1860 and formed a separate government in 1862. The first president was Jefferson Davis.

The immediate cause of the secession was the question of slavery. The American Civil War (1861-65) followed. The Confederate States ceased to exist when Lee surrendered to Grant at Appomattox Court House on April 9, 1865.

Confederation, union of a number of fully sovereign States for the maintenance of their external and internal independence. The union has organs of its own and a certain power over the member-states but not over the citizens of these States i.e. it is not a working arrangement and from the point of view of international relations the States remain separate. Such confederations have a tendency to turn into full Federal States (e.g. Germany 1866, U.S.A. 1867, Switzerland 1814) and no such confederation exists at the present day.

Confederation of the Rhine name of the 37 States which in 1806 seceded from the German Empire and placed themselves under the protection of Napoleon. The Confederation dissolved in 1813.

Confession the telling of one's sins to an elder or priest. Generally applied to the act of confession to a priest in the Roman Catholic or Eastern Orthodox Church. It is considered by Roman Catholics as one of the sacraments and is obligatory on all the faithful at least once a year. It is in use in the High Church section of the Church of England.

Confessional, the place used by a priest for hearing confessions in a Roman Catholic church. Formerly the priest knelt in open church and confessed but now a special partition which is generally provided for which the priest is shut off from the congregation. Confession of Faith, see Creed. Confessions (1) A priest confesses to his superior. (2) A Christian confesses to his fellow sanctity.

Confession, a rite of the Church in which the

is strengthened in the Christian Faith, and the Holy Spirit is imparted to him. The Roman Catholic and Eastern Orthodox Churches consider Confirmation as a sacrament, among Protestants it is retained only in the Church of England, where, though not generally considered as a sacrament, its reception is a condition antecedent to admission to Communion.

Conflict of Laws Most of the cases which occupy an English court are in every respect of a purely English character, frequently, however, especially in commercial cases, they contain some foreign element, *e.g.* one of the parties is a foreigner, or the subject-matter of the dispute is situated abroad, etc. In such cases two questions must be decided by the judge.

(1) Jurisdiction is the case one which an English court has legally the right to decide? (2) choice of law, *i.e.* assuming the court has jurisdiction, with reference to what body of law must the right of the parties be determined, *e.g.* is a contract made in France in respect of property in England to be governed by French law? Such cases occur in every country, and the rules of the local law by which the answers to these two questions are determined make up that part of the local law which is called "conflict of laws" or "private international law".

In England, the following broad principles, formulated by Dicey, govern the questions of jurisdiction and choice of law.

(1) Any right duly acquired under the law of any civilised country is recognised and, in general, enforced by English courts, and no right not duly acquired is enforced or recognised by English courts.

(2) English courts will not enforce a right otherwise duly acquired under the law of a foreign country where its enforcement

(a) Is inconsistent with a statute of the Imperial Parliament intended to have extra-territorial operation.

(b) Is inconsistent with the public policy of English law, or with the

maintenance of English political and judicial institutions.

(c) Involves interference with the authority of a foreign State within the limits of its territory.

(3) The courts of any country have jurisdiction over any matter with regard to which they can give an effective judgment, and no jurisdiction over matters in regard to which they cannot do this.

(4) The courts of any country have a right to exercise jurisdiction over any person who voluntarily submits to their jurisdiction.

(5) The incidents of a right of a type recognised by English law acquired under the law of any civilised country must be determined in accordance with the law under which the right was acquired.

(6) Whenever the parties to a transaction intend that it shall be governed by the law of a particular State, the effect of the transaction must be determined in accordance with the law contemplated by the parties.

Confucianism, one of the three religions of China, taking its name from its supposed founder Confucius (c. 551-479 B.C.). In a way it existed before Confucius himself, as he himself never claimed to do more than attempt to preserve the virtues of the past. The teaching of Confucius was conditioned by the period in which he lived. The feudal system of China which had endured for many centuries was breaking up. The emperors of the Chou dynasty were weak, and in the States the rulers were unable to restrain the power of their feudal tenants. The consequent oppressor and anarchy account for the important place occupied by political questions in Confucianism, and the gradual breaking up of the old system led to stress being laid on the virtues of ancient times. The times were evil; Confucianism propounded a mode of combating the evils and curing them.

The teachings of Confucius were not systematised by him to any great extent. The main lines are simple.

he religion is a secular ethical code Nothing is said by Confucius or his earlier disciples concerning God or a future life Later Chu hsi in the 12th cent A.D. denied the existence of both But both theism and atheism are compatible with Confucianism Confucius himself probably shared the current belief in a Supreme Being creator of the universe and in spirits of ancestors and of natural phenomena The doctrine is political and social conservatism with a code of practical ethics Moreover there was to be no rejection of the traditional cults ancestor worship and the ritual of the past were to continue This ritual altered through the ages comprises practically the whole of Confucianism to-day for the real essence of his teaching his social philosophy was practically ignored in the tumult following the Chinese revolution Confucius taught a religion if so it can be called entirely social and practical His aim was reform—conservative reform—not salvation Society divinely ordered is made up of a series of relationships of authority and obedience ruler and subject father and son husband and wife The ruling principle of the one should be benevolence of the other submission Loyalty is the foundation of social order and violence of every description is to be avoided In personal relations and in social life the golden rule should obtain—Do not do what you dislike when others do it

3 Confucius (c. 551–479 B.C.) the great Chinese sage and founder of the philosophical system known as Confucianism Confucius is the latinised form of the Chinese Kung Fu Tzu The details of his life are inextricably entangled with legend but tradition declares that he was born in the province of Lu the son of an officer of good family He was very poor in his earlier years and engaged in manual labour Later he began teaching and gathered round himself a group of disciples (see CONFUCIANISM)

After years of wandering during which

he is said to have met Lao-tse the founder of Taoism (q.v.) he held several official positions in the state of Lu Unfortunately the Prince of Lu failed to practise the virtues Confucius most insisted upon and the Sage reluctantly decided to leave his native State He did not return to Lu for 14 years and never took office again He died a few years later Confucius is supposed to have written some of the most deeply revered classics of Chinese literature including the *Shu Ching* or Book of History the *Shi Ching* or Book of Odes and the *I Ching* or Book of Changes

CONSULT J Legge *The Chinese Classics* vol. 1 R Wilhelm *Confucius and Confucianism*

Congé & Elect (pron kōnǝl ɛlɛkt) (To leave to elect) the King's licence to a dean and chapter to proceed to the election of a bishop or archbishop when the office has become vacant The licence always contains the name of the person who must be elected

Conger a marine edible fish of the eel family found in most oceans The skin is without scales and the back fin reaches from the neck to the tail tip Adult females may be 6 ft long but the males are much smaller Congers lurk in rock crannies sometimes between tide marks and feed upon Crustaceans cuttle-fish herring and mackerel etc

For breeding purposes they seek deep water and the young conger known as the morris fish is ribbon-like and translucent but when 6 in long it changes into a small conger resembling the parent

Congleton, borough in Cheshire England situated on the R Dane first granted a charter in 1492 The principal industries are silk and cotton weaving and iron and brass founding Bradshaw the regicide judge of Charles I was its mayor in 1637 Top (1931) 12 835

Conglomerate a rock consisting of well rounded fragments bound together by some form of cementing material

The pebbles may vary in composition and size from boulders to fragments only a little larger than sand-grains. The cementing material is also variable, but calcite and iron oxide are the most usual. Some quartz and limestone conglomerates can be cut and polished to make a handsome stone. Conglomerates are really consolidated gravels (*qv*), and indicate an aqueous origin, often the beginning of a large and protracted marine invasion.

Congo, the second longest river in Africa, and one of the longest in



Congo Types of Native Dress

the world. It moves in a great curve practically the entire length of the Belgian Congo, N W, and S W from the R Chambezi, its original stream, which rises between Lakes Nyasa and Tanganyika, to its mouth on the S Atlantic Ocean on the borders of Angola and Belgian Congo. The Chambezi proceeds in a S W direction through the swamps S of Lake Bangweulu, then turns N as the R Luapula, and passes *via* two sets of falls into Lake Mweru, some 100 m distant. N. of this lake it is joined by a W. tributary, the Lualaba. The

stream then becomes the Lualaba-Congo, and crosses the Equator. It becomes the Congo proper at Nyangwe, and in this part of its course are the Stanley Falls, which extend in all for more than 50 m. From these falls the river is navigable for shallow draught vessels for nearly 900 m, proceeding N W and W, and turning finally S. For many miles, in the district of Stanley Pool, the river is unnavigable.

The main tributaries, apart from those already mentioned, are the Kasai, Ubangi, Aruwimi, Itimbri, Mongala, and Sanga. The total area drained by the Congo and its tributaries is upwards of 1,420,000 sq m, its total length is *c* 3000 m. Where the Mongala enters the river are two large islands, Esumba and Nsumba, the stream is here more than 9 m wide. In the early 19th cent an unsuccessful effort was made to explore the river by a British naval mission, nothing more of note was done until the famous voyage of Stanley in 1876 and 1877, which established the main course of the river.

Congo, Belgian, *see* BELGIAN CONGO.

Congo Red, a dye belonging to the class known as azo-dyes (*see* AZO-COMPOUNDS). It is manufactured from benzidine and naphthionic acid, and can be used directly on cotton without employing a mordant. It is also used as an indicator (*qv*) in chemistry.

Congregation, an assembly of members of a University. In the Roman Catholic Church, a religious community whose members follow common rule, without solemn vows. The name is also given to a group of houses in a religious order allied to purposes of government.

Congregationalism, a type of government in the Christian Church based on the autonomy of the local congregation. As opposed to Episcopacy, Presbyterianism it is democratic. Based on the principle that God must govern His Church directly through Christ, without human intervention, it rejects both episcopal and Presbyterian government.

This principle has had a long history. It is found in the primitive Church but gradually developed into other forms of government. In the Middle Ages only a few held this principle e.g. the Waldenses and the Lollards and they were persecuted as heretics. With the Reformation a strong congregational movement developed in the Brownists or Independents.

To-day congregationalism is accepted by many people particularly by members of what are called Congregational Churches. They formed a Union in 1837 but still decline to impose a religious test on their members apart from the insistence on congregationalism as a form of Church government. Members of this Church are generally noted for the liberality of their views both in religious and political matters. In Great Britain there are 5000 churches and 500 000 church members bound together in the Congregational Union.

Congress (1) an assembly of the heads or representatives of different nations for the discussion of specific international questions. Any power interested may issue invitations but the exact nature and scope of the business must be made clear. No decision is binding unless unanimous but conclusions are embodied in a convention which finally becomes a treaty on being signed by all representatives. One of the most famous was the Congress of Vienna 1814 at which the European statesmen endeavoured to arrange the partition of the Napoleonic Empire and which was broken up by the return of Napoleon himself from Elba. Lord Castlereagh represented England and Metternich the Austrian Empire.

(2) The National Legislature of the United States composed of two houses the Senate and the House of Representatives. The Senate now numbers 96 members two being elected by each state for six years while the House of Representatives consists of 435 members elected for two years from the States in proportion to population.

States are divided into a number of districts equivalent to the number of representatives returned and in practice only a resident of the district concerned is likely to be returned. Five extra delegates attend the House of Representatives but without powers of voting two from the Philippines and one each from Alaska Hawaii and Puerto Rico. The House of Representatives holds two sessions in its two years term one of five months the other of three beginning in successive Decembers. It elects a speaker to preside over its meetings while the vice president of the republic functions in this capacity in the Senate.

Congress is not an executive body and its power of legislation is limited on the one hand by the State legislatures and on the other by the Constitution. The latter can only be amended by a two thirds majority in each house and the subsequent approval of three fourths of the States. Any Act adjudged unconstitutional may be nullified by the Supreme Court of the U.S.A. Within these limitations Congress can levy taxes regulate trade and commerce borrow money coin currency declare war maintain an army and navy legislate for the District of Columbia build roads etc etc. The president may veto an Act of Congress but the latter has a further power of overriding the president. Candidates are nominated by the party organisations and are nearly always elected on their party ticket and not on individual merit.

Congress developed from the old Continental Congress and is of later date than the constitution. Many of its powers including notably the control of the currency were voluntarily given up to President Roosevelt in the spring of 1933.

Congreve, William (16 0-17 3) Eng. Irish dramatist. His first play *The Old Bachelor* (1693) was an immediate success. *The Double Dealer* appeared in the same year. *Love for Love* (1695) *The Mourning Bride* (1697) and *The Way of the World* (1 00) his master

piece, were his three other plays. His reputation, which is very great for a writer with so small an output, rests almost entirely on *The Way of the World*. This, one of the greatest comedies in the language, is considered by some equal to the comedies of Molière, with which, indeed, it has much in common.

Conic Sections, see **GOMETRY**

Conifers (*Coniferae*), a family including pines, larches, firs or spruces, cedars, cypress, junipers, yew and arbovitæ. Many conifers are tall forest trees of pyramidal shape, the others are irregularly branched shrubs. The male flowers are either solitary or aggregated in clusters, and fall after shedding their pollen. The female flowers vary in the different genera.

Conington, John (1825-1869), English classical scholar, professor of Latin at Oxford (1854-69), published translations of the *Æneid* (1866) in octosyllabic verse, part of the *Iliad* (1868) in the Spenserian stanza, and the *Odes*, *Satires*, and *Epistles* of Horace.

Coniston, village in Lancs, by the lake of the same name, Ruskin (*qv*) died at his neighbouring estate, Brantwood, and is buried in the local cemetery.

Conjeeveram, sacred city in Madras, S India, noted for its ancient temples and shrines. Pop 62,000.

Conjugal Rights, Restitution of, see **MARRIAGE, LAW OF**

Conjunction, see **GRAMMAR, OBSERVATORIES**

Conjuring. The art of producing apparently magical effects by means of optical illusions is of great antiquity, having been practised by the Babylonians and Egyptians. There have been expert conjurers among Asiatic peoples from time immemorial, especially the Hindus and Chinese. In the *Franklin's Tale* Chaucer speaks of spectral appearances produced by "subtile tregetoures," apparently reflections thrown from mirrors on to smoke or incense. An elementary knowledge of practical chemistry enabled such tricks as holding live coals in the mouth, or lighting many candles

simultaneously, to be performed in very early times. J. E. Robert Houdin, in 1846, was the first conjurer to use electro-magnetism in producing stage illusions. "Vanishing tricks" by means of mirrors have been performed since the 18th cent. The mechanical resources of the conjurer were greatly increased by the inventions of J. N. Maskelyne (1839-1917).

Conjuring without apparatus is known as *sleight-of-hand*, *legerdemain*, or *prishdigitation*. Its effects are produced chiefly by "palming," i.e. concealing objects in the palm of the hand or between the fingers.

Connaught (*Connacht*), Irish province, containing the counties of Mayo, Sligo, Leitrim, Roscommon, and Galway, and bounded E. mainly by the Shannon, and W. by the Atlantic. For local products and topography, see separate counties. In early centuries Connaught was an independent State, in the 12th cent it was ruled by the O'Connors, and later taken from them by Henry III, and given to the de Burghs, who also became lords of Ulster. In the 16th cent the local landholders were made knights of the English Crown. It is now part of the Irish Free State.

Connaught and Strathearn, Arthur Wm Patrick Albert, Duke of (b 1850), third son of Queen Victoria. Married Princess Louise Marguerite of Prussia (d 1917), 1879. He commanded the Guards brigade in Egypt, 1882, and served at the battle of Tel-el-Kebir. Commanded the Bombay Army, 1886-90, and was appointed general, 1893. Represented King Edward at the Delhi Durbar, 1903, and opened the first S. African Parliament, 1910. Was Governor-General of Canada, 1916-20, and represented King George at the inauguration of the Indian Provincial Legislative Councils, 1920. His son, PRINCE ARTHUR OF CONNAUGHT (b 1883), entered the Hussars, 1901, served in the World War, and was Governor-General and Commander-in-Chief of the Union of S. Africa, 1920-3. He married the Duchess of Fife, 1913.

Connecticut, N.E. maritime State of the U.S.A. immediately N of Long Island Sound and W of Rhode Island. It is hilly in the N.W. and N.E. with large plains in the centre and S. Principal rivers are the Connecticut (300 m.), the Thames and the Housatonic all flowing from N to S with falls and rapids in the hills. There are several lakes in various parts. The climate varies but the rainfall is good and the soil fertile. The growing industrialisation of Connecticut during the present cent. has reduced agriculture but tobacco is still grown. Dairy farming and poultry keeping are both important and cattle, sheep and horses are raised. The minerals of Connecticut have long been worked but the output is now falling off. They include iron, cobalt, nickel and stone. Manufactures are of great importance and include in order of value brass, broods, hardware, machinery, textiles and hats. Fisheries are valuable. Among the many great commercial towns is Hartford the capital (164 100) which is the insurance centre of the whole United States. Others are New Haven (16th 700) Bridgeport (146 00) and Waterbury (100 000) a watch-making centre. The many educational centres include Yale University (at New Haven). Area of the State 4965 sq. m., pop. 1 606 900.

Connemara, *see* GALWAY

Conning Tower *see* SUBMARINE

Connolly James (18 0-1916) Irish Socialist. With James Larkin he directed the great Dublin strike 1913 which resulted in the formation of the Citizen Army. Connolly joined the Sinn Féin movement and was Commander-in-Chief in the Easter rising 1916. He was executed by the British.

Connor Ralph, pen name of Chas. W. Gordon (b. 1886) Canadian missionary and novelist. He wrote among other works *The Sky Pilot* and *Down by Galilee*.

Connolly John (1794-1866) English physician. He graduated at Edinburgh in 1821 and in 1828 became Professor of Physics at University College, Lon-

don. He brought about many reforms in treatment of the insane.

Conon (1) (d. c. 300 B.C.) Athenian general. He served in the Peloponnesian War and after the Athenian defeat at Egospotami (411) in 405 B.C. escaped to Cyprus. When war broke out in 400 between Persia and Sparta Conon obtained joint command of the Persian fleet and defeated the Spartans at Cnidus (394) in 394.

(2) (3rd cent. B.C.) Greek astronomer and geometer. He invented the curve known as the *Spiral of Archimedes* compiled observations on solar eclipses and drew up a meteorological calendar.

Conquest, the taking possession of enemy territory by military force. Article 10 of the Covenant of the League of Nations contains a mutual guarantee against the forcible annexation of territory.

Conquistador, *see* COON-CAN

Conquistadores name given to the Spanish Conquerors of S. America collectively and in particular to their more important leaders.

Conrad the name of four German kings and emperors.

CONRAD I (d. 918) chosen German king in 911. He was engaged in wars with Normans, Magyars, Lorraine and Saxony and was succeeded by his chief enemy Henry the Fowler of Saxony.

CONRAD II (c. 990-1039) Roman Emperor and founder of the Franconian dynasty succeeded in 1024. His aims were to consolidate the rebel principalities of Germany and to extend the imperial rule in Italy and though not entirely successful he went far towards achievement of these objects.

CONRAD III (1093-1155) German king became Duke of Franconia in 1115 and Regent of Germany a year later. He was elected rival king to Lothair the Saxon in 1127 and king of Italy in 1128. But he was not recognised by the Popes and in 1132 he returned to carry on the war against Lothair. In 1138 after Lothair's death he was again chosen German king but was forced to fight against Bavaria and

Saxony until 1142. Germany was in a chaotic state, and Conrad was unable to venture into Italy to deliver the Pope from the Romans and Sicilians. Finally, in 1147, he appointed his son Henry as his successor, and headed a Crusade into Palestine. After an unsuccessful campaign he returned to Germany, where he died in 1152.

CONRAD IV (1228-1254), King of the Romans, 1237, Emperor, 1250. He opposed the Pope, and opened war on the Archbishop of Mainz. After a campaign of doubtful success, he marched into Italy, where he died.

Conrad, Joseph (Józef Konrad Korzeniowski) (1857-1924), novelist who wrote in Eng. b in the Ukraine. For twenty years he worked in merchant ships, as mate and master, his first novel, *Almayer's Folly*, appeared in 1895. Others of his many works are *The Nigger of the Narcissus* (1897), *Lord Jim* (1900), *Typhoon* (1903), *Nostromo* (1904), *The Secret Agent* (1907), *Chance* (1914), *Victory* (1915), *The Rescue* (1920), and *The Rover* (1923). His novels are remarkable for their power, mysticism, artistry, and command of the English language.

Consalvi, Cardinal Ercole (1757-1824), an Italian Cardinal who conducted many negotiations between the Papacy and Revolutionary France, including the negotiation of the Concordat with Napoleon in 1801. Later, however, Napoleon secured his dismissal and exile, and he did not return to power until after Waterloo, when he resumed his appointment of Secretary of State to the Pope.

Consanguinity, the relation between persons descended from a common ancestor, it may be lineal or collateral. Marriages made within the prohibited degrees of consanguinity or affinity (q.v.), set out in the Book of Common Prayer, are void. But by Acts of 1907 and 1921 marriages with a deceased wife's sister, or a deceased brother's widow, have been validated, and since 1931 marriages with nephews or nieces by marriage.

Conscience, Hendrik (1812-1883),

Flemish novelist, had a large share in the revival of Flemish national literature and language. His first work was *In't Wonderjaar 1566* (1837), others are *Batavia* (1858), *De jonge Dokter* (1860), and *De burgemeester van Luik*. Many of his novels have been translated into English.

Conscience Clause, term denoting a clause in certain British Acts of Parliament dispensing from certain duties persons who have religious objections to their performance.

Conscription, the compulsory training of every eligible man for military service. Armies through the Middle Ages and the Renaissance period had been successively feudal, voluntary, and professional, and after the breakdown of feudalism had had little to do with the ordinary citizen. By the end of the 18th cent. the standard of professional armies had fallen low, and the tremendous pressure on disorganised Revolutionary France brought matters to a head. At the instigation of Napoleon, conscription or compulsory service was introduced by Jourdan in 1798. An overwhelming success of the system in providing army after army for Napoleon's campaigns (over 2½ million men in 14 years) caused it to be adopted by Prussia after 1815. By the end of the century it was in force in nearly all continental countries.

The details of conscription vary, but in general all men, on reaching a certain age (19-21 years), are required to undergo for a period of 6 months to 3 years an intensive training with the army, before returning to their normal avocation. In this way a huge trained reserve is built up, which in France is estimated at c. 5 millions at any given time. In France there are very few exemptions, while in Spain a quota is required from every district, which is filled by lot.

Completely voluntary recruiting was carried on in England until well into 1915, when compulsion with the right of appeal was introduced by the Derby. The first Military Service

1916 introduced a complete system of conscription extended by successive similar Acts which increased the age limits and lowered the qualifications. In the U.S.A. the Selective Service Act of 1917 instituted a similar system dealing with a first enlistment of one million men. In both countries Conscription ceased after the World War.

Conscription is the outcome of the 19th-cent military tenet that vast numbers and huge reserves are the deciding factor in war. The increased mechanisation of modern armies has changed the emphasis to economic resources and conscription is regarded by many modern authorities as out-of-date. A smaller highly trained army being regarded as more efficient.

Consecration, the act of dedicating anything or person to the special service of God. The word is particularly used of the sanctifying in the Christian Sacrament of the Lord's Supper, Holy Eucharist or Mass (q.v.) of bread and wine so that they become (according to Catholic and Eastern Orthodox belief) or (according to Protestant belief) convey to the recipient a specially intimate participation in the Body and Blood of Jesus Christ.

Conservation of Energy *see* DYNAMICS

Conservatism. The Conservative Party in England is derived from the Tories or Court Party of the Restoration who opposed the Whigs or Country Party. During the 18th cent. the Tories included principally the small land-owners and the clergy and came to support the waning power of the King in controlling policy. Only at the end of the cent. did they begin to commit themselves to their more modern creed of supporting the *status quo* and opposing the democratic reforms born of the French Revolution and espoused by the Whigs. Gradually however the party adopted a policy of moderate and constitutional reform and came to dislike the negative name of Conservative which began to be applied to it about 1830. It still opposed the Whigs now becoming

known as Liberals who worked for more radical and sudden changes. The party gradually drew in most of the great land-owners and those whose power was derived from traditional sources as against the new merchant and trading class which stood for freedom of trade and a new commercial prosperity.

There was great solidarity in the internal organisation of the Party which flowered under Disraeli and gained a considerable accession of strength from the Liberals (Liberal Unionists) who broke away from Gladstone's Irish Home Rule policy. A large section of the Party, especially the large industrialists who had slowly come in, supported the tariff reform campaign of Joseph Chamberlain early in the 20th cent.

Party Government was superseded by a coalition during the World War and in 1918 a further Coalition Government was returned to power in which however the Conservative element dominated. The purely Conservative Government of 1919 found itself for the first time faced by an opposition in the main not Liberal but Socialist. Since that time the division of allegiance in Parliament has been increasingly between the Conservatives and the Labour Party. Conservatism to-day stands for the maintenance of the existing economic and political system for its gradual reform by constitutional methods for moderate Protectionism and for the principle of non interference by the State except where modern conditions make it essential.

Consideration (law) *see* CONTRACT
Consistory Court, the spiritual court of a diocesan bishop in the Church of England presided over by a lawyer his Chancellor administering ecclesiastical law. In the Church of Rome it is a meeting of Cardinals presided over by the Pope to discuss important ecclesiastical affairs. *See also* ECCLESIASTICAL COURTS

Console, in architecture an ornamental bracket to support a

usually in a curved form. It was a favourite device with architects of the Baroque period. Later, tables were made expressly for standing against walls, in which console supports took the place of legs. These were often of metal and marble, and long mirrors were made to hang or be fixed above them, the frames designed to match the metal-work of the tables.

Consols, name commonly used for the British Government Consolidated 2½ per cent stock. There is no redemption date, the holder having only the right to interest payments. Some redemption takes place by the purchase of the stock by the Government broker for the National Debt Commissioners. The total amount outstanding is c. £275 millions. Before the war, consols constituted the bulk of the *National Debt*.

See also NATIONAL DEBT, STOCK EXCHANGE, STOCKS AND SHARES.

Consort, term applied to the spouse of a reigning sovereign. *Prince Consort* was the official title of Prince Albert of Saxe-Coburg-Gotha after his marriage to Queen Victoria.

Conspicuous Service Cross, instituted in 1901, awarded to officers in the Royal Navy below the rank of Lieut.-Commander and to Warrant Officers. It was replaced in 1914 by the Distinguished Service Cross.

Conspiracy (law), an agreement by two or more persons to carry out an unlawful common purpose, or a lawful common purpose by unlawful means. Conspiracy is a crime, and if it inflicts loss on an individual, gives rise to an action for damages. See also TRADE UNION.

Constable (Lat. *comes stabuli*, "count of the stable," master of the horse), an officer of high rank in several mediæval monarchies. The *Lord High Constable of England* was the highest officer in matters of chivalry and war. His power was often abused, the last regular holder of that rank was Edward Stafford, 3rd Duke of Buckingham, under Henry VIII. The *Lord High Constable of Scotland* had formerly the

command of the King's armies in the absence of the King, and was judge of all offences committed within 4 m. of the King's person, Parliament, or Privy Council. The office has been hereditary since 1314 in the family of Hay, Earls of Erroll, and is expressly reserved in the Treaty of Union. The *Constable of France* was the King's chief officer, Commander-in-Chief of the Army, and highest judge in matters of chivalry. The office was abolished in 1627, though Napoleon revived it temporarily in favour of his brother, Louis Bonaparte. See also POLICE.

Constable, Archibald (1774-1827), Scots publisher, founded the *Edinburgh Review* (1802-1829), and published many of Sir Walter Scott's works.

Constable, John (1776-1837), English artist, born at East Bergholt in Suffolk, where his father was a prosperous miller.

His early work was influenced by the Dutch painters and Gainsborough, and he served an industrious apprenticeship, copying the paintings of these and other masters. He also painted a number of portraits, mainly for financial reasons, and it was not until 1811, when he exhibited a large painting of Dedham Vale, that his remarkably individual talent became evident. In 1819 he became an A.R.A., in 1824 his *Hay Wain* was exhibited in France, where it won a medal, and in 1829 he became R.A.

Constable was undoubtedly one of the greatest landscape-painters of any country; his paintings were invariably faithful to the spirit of the land. His subjects were chosen in Suffolk, at Salisbury, Brighton, and Hampstead, from the quiet everyday landscapes of England, and were rendered beautiful by his careful construction, his freshness of colour, and, above all, by his wonderful painting of the cloudy skies so typical of England.

Numerous examples of his paintings exist in the English national collections. Among the most remarkable must be mentioned *Salisbury Cathedral*.

(18 3) *The Lock* (1894) *The Leapin Horse* (18 6) *Dedham Vale* (18.8) and *Salisbury Cathedral from the Meadows* (1831) He had a considerable influence on the development of landscape painting in France and exerts the same influence to-day both on French and English painters even of the most modern schools

Constance (*Konstanz*) historic German town of Baden situated at the exit of the Rhine from Lake Constance Among its notable buildings are the Cathedral *Kaufhaus* (15th-cent ware house) and several ancient palaces The famous Council of Constance [see **COUNCIL GENERAL**] was held here in the early 15th cent Constance is now of some importance as a trading and manufacturing centre local products include textiles chemicals and machinery Pop 39 000

Constance, Lake (*Bodensee*) lake on the Rhine on the borders of Germany and Switzerland and fringing the N.E. corner of the Austrian Tyrol Its surroundings are highly picturesque and it is a favourite spot for tourists Area 200 sq m

Constant I (c 300-350) son of Constantine the Great became under his father and after the latter's death ruler of Italy Africa and W. Illyricum he repulsed an invasion by his brother Constantine in 340

Constant II (630-668) Roman Emperor of the East succeeded his father Constantine III in 641 His reign was disturbed by frequent and disastrous Arab and Lombard invasions by which Africa and large parts of Italy and Greece were lost

Constant, Jean Joseph Benjamin (1845-1900) French painter born in Paris and exhibited at the Salon at the age of 24 It was not long before his paintings of Eastern subjects such as *Samson and Delilah* (1873) and *Prisoners of Morocco* (1878) were widely admired and he was made a member of the Institut de France He also painted some ceiling and mural decorations in public buildings and his portraits include Queen

Victoria Queen Alexandra and Pope Leo XIII

Constantan, an alloy of 40 per cent nickel and 60 per cent copper It is used to a considerable extent for the manufacture of resistance coils and electrical heating elements owing to its low electrical conductivity See also **NICKEL**

Constantine (1) Department of N Algeria bordering on Tunis pop 2 484 700

(2) Capital of the department situated about midway between Tunis and Algiers It is now a notable grain centre and has manufactures of leather and woollens Buildings of interest are the Bey's palace several mosques the cathedral and the Governor's residence Many portions of the old walls remain Constantine was founded before the 2nd cent B.C. and was an important and wealthy Numidian city It fell to the Romans later to the Arabs and became French in the 10th cent Pop 104 900

Constantine, name of several Roman emperors

CONSTANTINE I Flavius Valerius Constantinus the Great (c A.D. 78-337) was the illegitimate son of Emperor Constantius I and on his father's death was proclaimed emperor 306 After 6 years of dispute with various contestants Constantine acquired supreme power in the W. by his defeat of Maxentius near Rome when he saw the Cross in a vision He secured toleration for Christianity in 313 and in 324 overthrew Licinius Emperor of the E. He moved his capital from Rome to Byzantium (Constantinople) 330 and made Christianity the State religion After further victories Constantine died at Nicomedia receiving Christian baptism before his death He imposed an absolute monarchy hereditary in his line upon the Empire replaced the Senate by a new aristocracy and separated civil from military administration Christian influence is evident in his social reforms

CONSTANTINE II, his son (c 316-40), disputed the division of the empire with his brothers, Constans and Constantius, and was killed while invading Italy.

Of the remaining emperors of the name, Constantine XI Palaeologus, who reigned 1448-53, the last emperor of the E was forced to surrender Constantinople to the Turks in 1453.

Constantine I, King of Greece (1808-1923), ascended the throne, 1913, on the assassination of his father, George I. He gained popularity through his country's successes in the second Balkan War, and on the outbreak of the World War advocated neutrality. His sympathies were with Germany, and he vetoed Venizelos's (*qv*) proposal to join the Allies in Gallipoli, 1915. Constantine twice forced Venizelos to resign, and carried out a policy generally hostile to the Allies. Greece was accordingly blockaded in 1916, and Allied troops landed at Athens. Constantine resigned in favour of his son Alexander, 1917, went to Switzerland, but was recalled, 1920. The disastrous campaign against the Turks in Asia Minor, 1921-2, led to his abdication, and he died at Palermo, being succeeded by his son, George II (*qv*).

Constantinople (*Istanbul*, *Fr* *Stamboul*), city of European Turkey, and capital of the Turkish Empire until it was superseded by Angora in 1924. It is situated at the S end of the Bosphorus. The city is surrounded by water on three sides, and for centuries the landward approach was very strongly fortified. Its appearance is picturesque and imposing, as it is built on several hills, but the streets are narrow and crowded, and many of the buildings dark and insanitary. It is usually considered as including the suburbs that have grown up around it, the most important of these are Galata, the industrial and shipping centre on the magnificent harbour of the Golden Horn, Pera, the European quarter, and Scutari on the other side of the Bosphorus. In the

city proper are many buildings of the greatest historical and archaeological interest, foremost among them the great mosque of St Sophia, built as a Christian church by Justinian in the 6th cent, and famed for its internal decoration and structural beauty (see *BYZANTINE ARCHITECTURE*).

The mosque of Suliman the Magnificent is a beautiful part-copy of it, and of many others, the mosques of Mohammed II, Mir Achior Jamst, and Fenari İsa Mesjidi, all formerly Christian churches, are architecturally notable. The remains of the Hippodrome (Roman), the Sultan's palace, the old Seraglio, the ruins of Justinian's palace, the Golden Gate, and a score of other buildings and monuments are well worthy of mention. The modern city was the capital of the Sultans for nearly five centuries. The centre of E Christendom, it was founded by Constantine on the site of the earlier city of Byzantium in the 4th cent AD, to replace Old Rome as the capital of the empire, and was named New Rome, it was attacked by the Saracens in the 7th cent and by the Bulgarians in the 9th and 10th cents, captured twice by the Crusaders in 1203 and 1204, being won back by Michael Palaeologus (*qv*) in 1261, and by the Turks in 1422, and finally in 1453, when it fell into their hands. It was blockaded and bombed during the World War, seized by the Turkish Nationalists who deposed the Sultan in 1922, and lost its historic position as capital two years later.

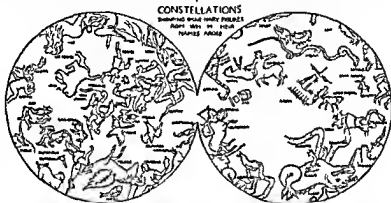
During the present century the city has been considerably modernised—electric light, tramways, telephones, better sanitation, and an efficient fire-brigade (it had been severely damaged many times in the past by fire) have all been introduced. There are schools for the Armenian, Turkish, and Greek populations, and the university is open to women. Commerce has been seriously damaged by the World War and subsequent events, but shipping is still very important; there are exports of grain, carpets,

cludes sweetmeats Oriental curiosities and large imports of all manufactured goods Pop 690 000

Constantinople Councils of, eight general councils of the Roman Church held at Constantinople between 301 and 869 of which 4 were accepted by the Western Church as Ecumenical The most important were the first under Theodosius (381) which denounced Arianism and is recognised as the 2nd Ecumenical Council that in 450-451 recognised as the 6th Ecumenical Council which rejected the Monothelite (qv) doctrines as heretical and the Councils of 54-815 which

factures but the import and export trade is considerable as Constanza is the country's chief seaway outlet Oil is brought by a pipeline direct from the Rumanian fields cereals are also a valuable export Imports include machinery textiles and metal goods The port and harbour works are extensive though there is a tendency to silting Pop 98 500

Constellation, group of fixed stars named after a mythological person animal etc It must have been the earliest observers several thousand years B.C. who recorded that the fixed stars are not scattered uni-



regulated against the use of images known as the Iconoclastic Councils they were not accepted by the West and served to widen the rift between the two Churches

Constantine (c 280-306) Roman emperor from 306 father of Constantine the Great Successful as military ruler of Dalmatia he was appointed Caesar by the Emperor Maximian in 293 Gaul and Britain were allotted to Constantine who also gained control over the Rhine in 298 He died at York during a campaign against the Picts

Constanza (Kuslenje) Rumanian port situated on the Dobrudja coast of the Black Sea due E of Bucharest There are no important local manu-

factories but the import and export trade is considerable as Constanza is the country's chief seaway outlet Oil is brought by a pipeline direct from the Rumanian fields cereals are also a valuable export Imports include machinery textiles and metal goods The port and harbour works are extensive though there is a tendency to silting Pop 98 500

Constellation, group of fixed stars named after a mythological person animal etc It must have been the earliest observers several thousand years B.C. who recorded that the fixed stars are not scattered uniformly over the sky but appear to be grouped into figures now named constellations This confines us to stars visible to the naked eye and also excepts the Milky Way (qv) These observers had undoubtedly an elastic imagination they saw shapes and outlines of animals humans and inanimate objects with but the scantiest of framework The influence of astrology was very great in those days and the nomenclature of the constellations and asterisms (parts of constellations) which has come down to us indicates the mythology legends and religious beliefs of the ancient Babylonians Egyptians and Greeks and also shows that their importance to navigation

was as great in the past as in the present (*see NAUTICAL ASTRONOMY*)

The constellations covering the whole celestial sphere are divided into three groups according to the regions in which they are seen—the Northern, the Southern, and the Zodiacal. The last-named group comprises a belt of 18 degrees width, crossing the plane of the Earth's equator, and slightly inclined to it. It corresponds to the zone in which the sun, moon, and planets appear to move, and its middle circle is the ecliptic, the sun's apparent path, taken by the ancients as the celestial equator.

It is almost certain that the Babylonians distinguished at least 36 constellations, 12 in each region, and all the knowledge of the ancients was crystallised in the *Almagest* of Ptolemy less than 2000 years ago, in which as many as 48 were recorded. In 1603 Bayer added another 12, to be increased in later years by Halley, Hevelius, Lacaille, and others, and at the present day the International Astronomical Union recognises the configurations of 88 as mapping the entire pictorial sky—28 Northern, 12 Zodiacal, and 48 Southern.

Northern

Andromeda	Aquila
Auriga	Bootes
Camelopardus	Canes Venatici
Cassiopeia	Cepheus
Coma Berenices	Corona Borealis
Cygnus	Delphinus
Draco	Equuleus
Hercules	Lacerta
Leo Minor	Lynx
Lyra	Ophiuchus
Pegasus	Perseus
Sagitta	Serpens
Triangulum	Ursa Major
Ursa Minor	Vulpecula

Zodiacal

Aries (the Ram) γ
Taurus (the Bull) τ
Gemini (the Twins) π
Cancer (the Crab) σ
Leo (the Lion) Ω

Virgo (the Virgin) μ
Libra (the Balance) ϵ
Scorpio (the Scorpion) μ
Sagittarius (the Archer) ζ
Capricornus (the Goat) ν
Aquarius (the Water Carrier) \sim
Pisces (the Fishes) \times

Southern

Antlia	Apus
Ara	Caelum
Canis Major	Canis Minor
Carina	Centaurus
Cetus	Chameleon
Circinus	Columba
Corona Australis	Corvus
Crater	Cruce
Dorado	Eridanus
Fornax	Grus
Horologium	Hydra
Hydrus	Indus
Lepus	Lupus
Mensa	Microscopium
Monoceros	Musca
Norma	Octans
Orion	Pavo
Phoenix	Pictor
Piscis Australis	Puppis
Pyxis	Reticulum
Sculptor	Scutum
Sextans	Telescopium
Triangulum Australe	Tucana
Vela	Volans

It is noteworthy that all the zodiacal constellations named above were grouped by the earliest observers and were very important in ancient astrology (*qv*). Taking the ecliptic as the celestial equator, the ancients cut up the celestial sphere into 12 equal lunes, called "Houses," by 6 complete Great Circles (meridians of longitude) through the Celestial Ecliptic Poles (not the modern Celestial Equatorial Poles). The circular belt of the zodiac was thus divided into 12 portions called "Signs," each of length 30 degrees and height 18 degrees, and to each sign there corresponded a constellation—hence the 12 signs of the zodiac. They began counting the signs from one of the two points where the ecliptic crosses

the earth's equatorial plane and they used it as a zero from which to measure the latitude and longitude of a star on the celestial sphere. In their times the point was covered by Aries though owing to precession it has now shifted 30 degrees. Thus the first point in Aries as the zero for measurement was and still is called is now located in Pisces and not in Aries at all.

The stars which make up any given constellation are distinguished from each other by the letters of the Greek alphabet a system of nomenclature introduced by Bayer in the 17th cent. Thus we refer to Alpha and Beta Centauri (α and β Cent) for the first and second stars of the constellation Centaurus in order of brightness respectively. Nevertheless those stars which have special importance in brightness size or position are given particular names—e.g. Alderbaran (α Tauri) the brightest star in Taurus; Algol (β Persei) an important variable in Perseus. Other stars which are of great assistance in navigation and in astronomical research are Altair, Antares, Arcturus, Betelgeuse, Canopus, Capella, Polaris, Procyon, Rigel and Sirius.

Constipation, *see* BOWELS.

Constitution, a legal term used in two senses. It may denote the form and structure of the Government of a State whether it be federal or non-federal, autocratic or democratic or it may refer to that branch of the law which regulates the exercise of the sovereign power in a State dealing with such matters as the head of the State and his powers, the legislature, the judiciary, the executive or administrative body, the Army etc. In this sense constitutions are either flexible or rigid, i.e. based either on laws which can be altered as easily as any other law of the country or on laws which can only be altered by special machinery as in the United States. Again a constitution may be written or unwritten, i.e. it may be embodied in a kind of charter or solemn document, as in the United States, France and

Germany or it may be found in a variety of laws either enacted or depending merely on precedent.

The English constitution is unwritten in so far as a great number of its rules are to be found in legal decisions and not in enacted laws. It is flexible because Parliament can make or unmake any law by the same procedure and with the same ease. Finally theory and practice diverge so that though there are many things which can legally be done they are not done in fact. Other things too exist in practice which have no legal basis, e.g. the Cabinet system. In other words the rules of English Constitutional law are very largely convention which may or may not change in course of time but breach of which at any given time would be a serious breach of the constitution. Constitutional government, i.e. government by rule of law is a modern growth the example for which was set by England (*see* PARLIAMENT) but which did not become firmly established on the Continent until the 19th cent. under the influence of the Liberal ideas of Voltaire and Rousseau which led to the French Revolution and the growth of nationalist democratic governments.

Consubstantiation, the doctrine according to which the Bread and Wine in the Sacrament of the Lord's Supper are not converted into the Body and Blood of Christ but remain Bread and Wine with the presence of the Body and Blood of Christ added thereto. It is held by the Lutheran communion.

Consul, agent of a State residing abroad for purposes of various kinds, mainly to the interests of the commerce of the appointing State. He is not a diplomatic representative and does not enjoy diplomatic privileges except by special agreement. There are 4 classes: Consuls-General, Consuls, Vice-consuls, Agents-consular. Any person whether a subject of the State he represents or not may be appointed provided he is approved by which he is sent.

Consulate, building

consul transacts his official business. This is mainly concerned with shipping and commerce, in addition, particularly in the Levant and the Far East, British consuls have many judicial and political duties. Following are lists of British consulates abroad and of foreign consulates in London († Legation or Embassy, * Consulate-General)

(a) BRITISH ABROAD *Afghanistan*, Kabul †, Jalalabad, Kandahar. *Albania*, Durazzo. *Argentina*, Buenos Ayres †*, Rosario, 4 Vice-Consulates. *Austria*, Vienna †*. *Belgium*, Brussels †*, Antwerp *, Liège, Leopoldville, 6 Vice-Consulates. *Bolivia*, La Paz †, Oruro, Sucre, 1 Vice-Consulate. *Brazil*, Rio de Janeiro †*, Bahia, Pará, Pernambuco, Porto Alegre, São Paulo †, 12 Vice-Consulates. *Bulgaria*, Sofia †, 2 Vice-Consulates. *Central America*, Guatemala †*, San Salvador †*, Tegucigalpa †*. *Chile*, Santiago †, Antofagasta, Concepcion, Magallanes, Valparaiso *, 15 Vice-Consulates. *China*, Peking †*, Amoy, Canton *, Changsha, Chengtu, Chefoo, Foochow, Hankow *, Harbin *, Ichang, Kashgar *, Mukden *, Nanking, Newchwang, Ningpo, Shanghai *, Swatow, Tientsin *, Tientsin *, Tsinanfu *, Tsingtao, Weihaiwei, Yunnan-fu. *Colombia*, Bogota †, 4 Vice-Consulates. *Costa Rica*, San Jose, Port Liman. *Croacia*, Canca *. *Cuba*, Havana †*, 1 Vice-Consulate. *Czechoslovakia*, Prague †, 3 Vice-Consulates. *Danzig*, Danzig. *Denmark*, Copenhagen †, 14 Vice-Consulates. *Dominica*, Santo Domingo †, 4 Vice-Consulates. *Ecuador*, Quito *, Guayaquil. *Egypt*, Cairo, Alexandria *. *Estonia*, Tallinn. *Ethiopia*, Addis Ababa †, Dargila, etc. *Finland*, Helsinki (Helsingfors) †, 13 Vice-Consulates. *France*, Paris †*, Algiers *, Bordeaux, Brest, Guadeloupe, Havre, Lille, Lyons, Marseilles *, Nantes, New Caledonia, Nice, Pondicherry, Rouen, Saigon *, Strasbourg *, 25 Vice-Consulates. *Germany*, Berlin †, Bremen, Cologne *, Frankfurt-am-Main *, Hamburg *, Leipzig, Mainz, Munich *, 10 Vice-Consulates. *Greece*, Athens †, Salonika *, Patros, Syra, 10 Vice-

Consulates. *Haiti*, Port-au-Prince †. *Hungary*, Budapest †. *Iraq*, Basra, Bagdad †, Mosul, 3 Vice-Consulates. *Italy*, Rome †, Cagliari, Florence, Genoa *, Spezia, Leghorn, Milan *, Naples *, Palermo, Trieste, Turin. *Venice*, 7 Vice-Consulates. *Japan*, Tokyo †, Dairen, Kobe, Nagasaki, Osaka, Seoul *, Tamsui, Yokohama †, 4 Vice-Consulates. *Latvia*, Riga †, Vice-Consulate. *Liberia*, Monrovia †. *Lithuania*, Kovno. *Mexico*, Mexico City †*, Guadalajara, Salina Cruz, Tampico, Vera Cruz, 3 Vice-Consulates. *Morocco*, Tangier *, Rabat *, Casablanca 3 Vice-Consulates. *Netherlands*, Hague †, Batavia *, Medan, Surabaya, Rotterdam *, Amsterdam *, Vice-Consulates. *Norway*, Oslo †, Bergen, 16 Vice-Consulates. *Panama*, Panama †, Colon. *Paraguay*, Asuncion. *Persia*, Teliran †*, Bushire *, Isfahan *, Kerman, Kermanshah, Meshed *, Mohammerah, Seristan an Kam, Sheraz, Tabriz, 2 Vice-Consulates. *Peru*, Lima †, Iquitos. *Poland*, Warsaw †, 5 Vice-Consulates. *Portugal*, Lisbon †*, Loanda *, Lourenço Marques *, Madeira, Oporto, St Michaels, 2 Vice-Consulates. *Rumania*, Bucharest †, Galatz, Cluj, Vice-Consulates. *Siam*, Bangkok †, 1 Vice-Consulate. *Soviet Union*, Moscow †, Leningrad *, Vladivostok. *Spain*, Madrid †, Barcelona *, Valencia, Bilbao, Malaya, Seville, Tenerife, Las Palmas, Vigo, 31 Vice-Consulates. *Sweden*, Stockholm †, Kalma, Gagnef. *Switzerland*, Basel, Bern †, Geneva. *Lausanne*, Zurich *, Davos, 4 Vice-Consulates. *Syria*, Damascus. *Tunisia*, Tunis *, Bizerta, 4 Vice-Consulates. *Turkey*, Istanbul *, Mersin, Smyrna *, Trebizond. *United States*, Washington †, Baltimore, Norfolk, Boston *, Chicago *, Detroit, Galveston, Honolulu, Los Angeles, Manila *, New Orleans *, New York *, Philadelphia *, Pittsburg, San Juan, Savannah, Jacksonville, St Louis, San Francisco, St Thomas, Seattle, 11 Vice-Consulates. *Uruguay*, Montevideo †. *Venezuela*, Caracas †, 5 Vice-Consulates.

Yugoslavia Belgrade 1 Sarajevo Zagreb 4 Vice-Consulates

(b) FOREIGN CONSULATES IN LONDON
 Albanian 119 Finsbury Pavement EC 2 American 16 Cavendish Square W 1 Argentinian 7 Lower Street W C 1 Austrian 18 Belgrave Square SW 1 Belgian 10 Belgrave Place SW 1 Bolivian 18 Grosvenor Place SW 1 Brazilian Allwyth House Aldwyth W C * Chilean 3 Hamilton Place W 1 Chinese 49 Portland Place W 1 Colombian 7 Sicilian Avenue W C 1 Costa Rican 33-36 King William Street EC 4 Cuban 95 Linden Gardens W 2 Czechoslovak 18 Bedford Square W C 1 Danish 7 Norfolk Street Strand W C 2 Dominican 67 Eaton Place SW 1 Ecuadorian 23 College Hill Cannon Street EC 3 4 Latvian 167 Queen's Gate SW 7 Finnish 103 Cannon Street EC 4 French 51 Bedford Square W C 1 German 9 Carlton House Terrace SW 1 Greek 131 Gower Street W C 1 Hungarian 11 Queen Victoria Street EC 4 Italian 4 Denmark Street W C 2 Honduran 15 Union Court EC 2 Hungarian 35b Eaton Place SW 1 Iranian 2 Queen's Gate SW 7 Italian 63 Portland Place W 1 Japanese 1 Broad Street Place EC * Latvian 87 Eaton Place SW 1 Liberian 10 Idol Lane EC 3 Lithuanian 10 Palace Gate W 8 Luxemburg Moorfields House EC * Mexican 8 Halkin Street SW 1 Monaco 31 Conduit Street W 1 Netherlands 8 Langham Street W 1 Nicaraguan 15 Union Court EC * Norwegian 21-24 Cockspur Street SW 1 Panama 23 Finsbury Pavement House EC * Paraguayan 12 Russell Square W C 1 Persian 10 Princes Gate SW 7 Peruvian 11 Regent Street SW 1 Polish 2 Upper Montague Street W C 1 Portuguese 40 Woburn Square W C 1 Rumanian 4 Cromwell Place SW 7 Russian 3 Rosary Gardens SW 7 Salvadoran 7 Union Court EC 2 San Marino 42 Pall Mall SW 1 Siamese 23 Ashburn Place SW 7

Spanish 20 Gorton Square W C 1 Swedish 329 High Holborn W C 1 Swiss 1 Bryanston Square SW 1 Turkish 10 Lower Sloane Street SW 1 Uruguayan 65 Harrington Gardens SW 7 Yugoslavian 195 Queen's Gate SW 7

Consumption *see* TUBERCULOSIS

Contango *see* STOCK EXCHANGE

Conte which literally means story is a term of not easily definable application widely used in literary criticism. A story whether long or short becomes a *conte* when it is endowed by its writer with a conscious artistry of style which rather than the inherent literary merit of the story itself constitutes its worth. This form has been cultivated chiefly though not exclusively in French literature in which it is particularly associated with the names of La Fontaine and Guy de Maupassant (*q.v.*)

Contempt of Court, disobedience to or disregard of the rules orders or dignity of a court punishable by fine or committal to prison until the offence is purged. Less serious offences may sometimes be purged by an apology and if necessary the payment of costs.

Conti Princes of a branch of the French Condé's LEANCOIS BOURBON (1558-1614) was created Marquis of Conti then Prince. He supported Henry of Navarre as king of France. He died childless and his widow was exiled for intrigue against Richelieu. In 1690 the title was revived in favour of his great grandson ARMAND DE BOURBON (1666-1665) brother of Louis the great Condé (*q.v.*) who took part in the Fronde rebellion and was imprisoned in 1650. He commanded the French forces in Spain in 1634 and later in Italy retiring after his defeat at Alessandria in 1657. A friend of Molière Armand secured his introduction to Louis XIV's Court. His son Louis DE BOURBON (1661-1683) fought in Flanders in 1693 and aided the Hungarians in defeating the Turks. He was succeeded by his younger brother FRANÇOIS DE BOURBON (1664-1709).

who also assisted the Hungarian Imperialists, and served in the Netherlands in 1689. He was offered the Polish Crown by Louis XIV in 1697, but retired in favour of Augustus II of Saxony. He was appointed to command troops in Italy in the war of the Spanish Succession, but died. Louis DE BOURBON (1717-1776), son of François, served in Bohemia in the War of the Austrian Succession (1741). He commanded the French Army in Italy, winning the battle of Coni in 1744. On being transferred to the Netherlands and to Germany, he intrigued to secure the Polish Crown from the feeble Augustus III, but his power was broken by Madame de Pompadour. He then became an advocate for the *parlements*, and a patron of Rousseau. His son, Louis François (1734-1814), served in the Seven Years' War, and supported Maupéou's ministry against the *parlements*. He left France on the outbreak of revolution, returned in 1790, but was banished. On his death the line became extinct.

Continent, see GEOGRAPHICAL TERMS, GLOSSARY OR

Continental System, the system of blockades carried on by both England and France during the Napoleonic Wars. By the Berlin decree (1806) Napoleon declared Great Britain to be in a state of blockade. His main endeavour was more to prevent British goods from reaching the Continent than continental goods from reaching this country. Great Britain retaliated by various Orders in Council. Napoleon involved himself in a war with Russia by his action, and Great Britain in a war with America over the searching of neutral ships in 1812.

Contingent Remainder, see REMAINDER

Continuation Schools are intended to provide further education for young persons who have left the elementary schools. The Education Act of 1902 placed the responsibility for their provision on County or County Borough Councils. These were Evening Schools. Day Continuation Schools were estab-

lished under the same authorities by an Act of 1918. These compulsory schools were allowed to lapse for financial reasons, but many authorities have established voluntary Day Continuation Schools. About 905,800 evening students and c. 21,100 day students attended such schools in England and Wales during the year 1930-31.

Continuation schools are also in operation for the purpose of providing training to unemployed boys and girls registered as such with the State employment exchanges. In many cases, attendance at these schools is made a condition of payment of unemployment benefit.

Contraband, goods prohibited to be imported or exported by the laws of a particular State. Contraband of war are such goods as are forbidden by either belligerent to be carried to the enemy on the ground that they enable him to carry on the war with greater vigour, e.g. munitions. By the doctrine of continuous voyage, first applied during the American Civil War, where goods which would be contraband if carried to an enemy port are being carried to a neutral port, they may be seized if it can be proved that they were intended to be forwarded to the enemy.

Contract, a legal term denoting an agreement made between two or more persons which is recognised by law, and whereby each party to the agreement undertakes to do, or to refrain from doing, a particular act in consideration of the other party undertaking to do, or to refrain from doing, some other specific act.

Essentials of a Contract. Speaking generally, three conditions must be fulfilled to create a legally enforceable agreement.

(1) The parties must intend to create a legally binding agreement.

(2) The parties must be agreed as to the terms of the agreement. This is shown by the presence of an *offer and acceptance*. An offer may be made verbally, in writing, or by implication.

To expose goods for sale at marked prices constitutes an offer to sell at such prices. To advertise a reward for a lost article is an offer to pay the reward to the finder. Acceptance is as essential as the offer and may likewise be shown verbally in writing or by implication. It must be communicated to the offerer unless the latter has expressly or by implication waived the necessity of communication. The commonest instance of such waiver is to be found in advertisements of a reward as for example the offer to pay a sum of money if a certain patent medicine fails to do what is claimed for it. Here the person who purchases and uses the medicine need not communicate his acceptance of the offer to the manufacturers but may claim the reward if the medicine fails to fulfil the promises of the manufacturers provided that he has adhered strictly to their conditions.

(3) There must be consideration unless the contract is in the form of a deed. Valuable consideration need not necessarily consist of money. It may be some right, interest or benefit accruing to the one party or some forbearance, detriment or responsibility given, suffered or undertaken by the other. A mere promise to pay a sum of money, unless made by deed, is not enforceable because there is no consideration. But a promise by A to purchase a specific article from B is valid because the consideration given by B is the promise to sell that article to A and to no one else.

Forms of Contract Contracts may be either simple or formal. *Simple* contracts are contracts made by word of mouth or in writing or in any way except by a deed which is a formal contract. A deed also called a *specialty* is an agreement in writing which is distinguished from a simple written document by the fact that it has been signed sealed and delivered. Delivery simply means putting into effect it may be intended to take effect immediately or not until some

condition has been fulfilled when it is called an *escrow*.

By the Statute of Frauds the following contracts must be made in writing (1) promise by an executor or administrator to answer damages out of his own estate (2) promise to answer for the debt or default of another (i.e. guarantee) (3) agreements in consideration of marriage (4) agreements affecting interests in land (5) agreements not to be performed within one year from the making thereof. By the Sale of Goods Act 1893 no contract for the sale of goods to the value of £10 or more is enforceable by action unless the buyer accepts and actually receives part of the goods sold or gives something in earnest or part payment or a memorandum in writing has been made and signed by the buyer or his agent.

Part as to Contract (1) Infants
Formerly contracts made by an infant were unenforceable against him, even if they were for necessities, though an infant could enforce a contract made for his benefit and could disaffirm it after attaining his majority. A contract made during his minority is a voidable contract. The present position is that all loans of money except for the purchase of necessities are voidable as against the infant and cannot be enforced by him when he is of age. A contract in regard to property of a continuing nature such as a lease, partnership, etc. will not be disaffirmed, but the infant will be treated as if he repudiates it when he attains majority. A contract for necessaries with an infant is enforceable against the infant because it is necessary to the infant's health and at the time they were made he was of age. These are essentially contracts for necessaries. Certain other contracts for necessaries for benefit such as a contract for medical treatment or apprenticeship are enforceable against the infant.

(a) *Walter J. Rouse* is a
lawyer & *Walter J. Rouse* is a
husband of *Walter J. Rouse* is a
that no *Walter J. Rouse* is a

except in regard to her personal services, since she had no property. She may now hold separate property, and make contracts in regard to it as if she were single, but the contractual liability attaches strictly to the property, and she cannot be imprisoned for debt. The husband is liable for his wife's ante-nuptial contracts to the extent of the property which he has acquired through her on marriage. A wife may pledge her husband's credit in so far as she acts as his agent. Agency may be express, or presumed from the fact of cohabitation, and in the latter case, she may pledge her husband's credit for necessities for herself, the children, and the household generally. This implied authority exists even though the person supplying the goods did not know she was married. A wife deserted by her husband may pledge his credit for necessities unless the desertion is due to her adultery.

(3) *Lunatics and Drunken Persons* Lunatics are bound by their contracts unless the other contracting party knows of the disability. They are liable for necessities, and may ratify their other contracts on recovering their sanity. Drunken persons are in exactly the same position.

(4) *Aliens* Contracts by or with aliens in times of peace are valid, but no ship wholly or partly acquired by an alien shall be deemed a British ship. War will suspend a contract until peace is restored unless the contract involves the immediate doing of an illegal act, when the contract becomes void. Contracts made with the subject of an enemy State after the outbreak of war are void. As to foreign sovereigns, ambassadors, etc., see PRIVILEGES, DIPLOMATIC.

Corporations Corporations are either common law corporations created by charter, or statutory corporations created by statute. The former can make any contract not expressly forbidden by its charter. The latter can make only contracts authorised by its memorandum of association. Contracts made by corporations must be

under seal unless the contract relates to a matter of trifling importance, such as engaging a clerk, or is made by a trading corporation in the ordinary course of its business, or the corporation is registered under the Companies Acts. However goods delivered or work done must be paid for unless a contract under seal is required by statute, as in the case of urban authorities contracting for goods or work exceeding £50 in value under the Public Health Act, 1875.

Illegal Agreements cannot be enforced. The essence of such contracts is that they are contrary to morality or public policy. Thus, a contract which tends to interfere with the course of justice, e.g. a contract to compound a felony, is illegal. So too is a contract for the sale of public offices or honours. A condition imposing a general restriction on marriage cannot be enforced, as it is a marriage brokerage contract (see GAMING; MAINTENANCE, MARRIAGE, RESTRAINT OF, TRADE, RESTRAINT OF, etc.).

Voidable Contracts Certain agreements, while not illegal and void, yet contain some flaw which enables the party aggrieved to reject the whole contract. Thus where there has been misrepresentation as to material facts, or concealment, where one of the parties has acted fraudulently or has exercised undue influence, the other party may avoid the contract. Money paid under a mistake of fact may be recovered unless the money was paid under pressure of bona fide legal proceedings, or the party making the payment has expressly waived enquiry into the facts. Money paid under a mistake of law is, broadly speaking, not recoverable, unless the mistake was induced by the other party's fraud. See also FRAUD, MISREPRESENTATION.

Contract Bridge, a variety of Auction Bridge (qv) in which only the exact number of tricks which the declarer contracts to make score towards game, has been known to a limited number

of expert bridge players since 1912 but has since c 1930 attained widespread popularity. The need for making an exact assessment of the value of the hand makes bidding more scientific in Contract than in Auction. Extra tricks above the contract score trick value above the line or 100 each if doubled and do not count towards game. The trick values are higher than in Auction and penalties are heavier especially after one game has been made. Each trick above 6 made by the declarer in clubs or diamonds scores 20 in hearts or spades 30. In no-trumps 30 is scored for the 1st 3rd 5th and 7th tricks 40 for the 2nd 4th and 6th. Game consists of 100 points and may be made by securing 3 tricks above 6 in no-trumps 4 in hearts or spades and 5 in clubs or diamonds. The bonus for *Grand Slam* is 1500 and for *Little Slam* 500 but the slam must be bid in order to secure the bonus. Making rubber in 2 games scores 700 above the line in 3 games 500. Honours are scored only if 4 or 5 are held in one hand 150 for 5 100 for 4 or in no trumps 150 for 4 aces.

If the declarer fails to make his contract the opponents score 50 for every undertrick as in Auction but if the bid has been doubled the penalty for the 1st undertrick is 100 for the 2nd 150 3rd 200 4th 50 and subsequently 300. There is no bonus for successfully making contract when doubled. A side which has made one game is said to be *vulnerable* and the penalties for failure to make contract are the same as if the hand had been doubled. If the declarer when vulnerable is 2 tricks down on contract the penalty amounts to 50 points or 500 if doubled. The bonuses for Great and Little Slams are increased to 250 and 700 respectively. Overtricks (tricks made above contract) score 200 each if doubled. Scoring for tricks and honours is not affected by being vulnerable.

Contract Note the summary of a contract sent by a broker or agent to his principal.

Convection, see HEAT

Convent (1) A community in the Christian Church living together for religious purposes under a rule. (2) The building in which the community lives. See ABBEY.

Conventicle Act (1664) declared that a meeting of more than five persons (except the household) for religious worship not in accordance with the *Book of Common Prayer* was a seditious assembly. It was repealed by the Toleration Act of 1689 (q v).

Convention (1) An assembly the word is used with many various meanings. It is particularly applied to special meetings of the Houses of Parliament in emergency apart from those normally convened by the Sovereign. The Restoration Parliament of 1660 was such and also that which recognised William of Orange in 1689 so too the extraordinary body summoned by Washington in 1787. () An agreement between States concerning matters not sufficiently important to be dealt with by treaty.

Conversion (law) unauthorised dealing with the goods of another so as to deprive him permanently or indefinitely of his property. The remedy is an action for damages formerly called the action of Trover (q v) and Conversion. By the equitable doctrine of conversion money directed by will settlement contract or otherwise to be used to buy realty or realty directed to be sold and turned into money are treated at law as if the conversion had already taken place and invested with the incidents of the property into which they were directed to be converted.

Converter Bessemer see IRON AND STEEL.

Conveyancing the transfer by mutual consent of the parties of real property by means of written documents or conveyances. Such transfer takes place chiefly by way of marriage settlement sale or gift. The actual conveyance must be by deed. In the case of marriage and sale the conveyance is the marriage articles which

ing contract, or by a contract for sale, followed by an investigation into the validity of the title which the transferor purports to convey

Conveyor, a machine by which material is carried from one position to another by automatic and continuous operation. Conveyors take an enormous variety of forms, but they can be divided into four main classes. The *belt conveyor* consists of a flat belt which passes continuously over pulleys with various corrugations or other devices for preventing slipping. Part of the belt, moving in one direction, is used to carry the objects or material to be conveyed, which may be fed on to it by hand or by any other means or simply made to fall off by the belt turning back over the pulley. Some kinds of material can be fed direct on to a belt from a hopper, the lower end of which nearly touches the belt. Belt conveyors are obviously unable to elevate material steeply, but are used to convey the articles around the works from one process to another, or for handling all kinds of powdered and granular material.

In the *chain conveyor*, the belt is replaced by a chain armed with various devices, such as scrapers, aprons, and buckets. The construction and sizes of chains have now been standardised, the links consisting of square frames carrying a pair of hooks at one side, which hook on to the corresponding opposite side of the next link. In addition, various types of these standard links are made for attaching various devices. Other types of chain are called *pinle chain*, and roller chain, similar to that used on bicycles, is also employed.

A *scraper conveyor* consists of a gulley along which an endless procession of scrapers attached to a chain is caused to move, anything thrown in at one end of the gulley being carried along to the other.

In the *apron conveyor*, two parallel endless chains are bridged by flat plates of wood or steel attached to their links, forming an endless moving platform.

Bucket conveyors, called *elevators* when they are used to raise material, consist of endless chains carrying buckets of various forms, usually of such a shape that they will pick up material like a dredger.

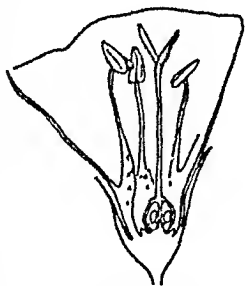
For finely divided or pasty material, *screw conveyors* are commonly used. These consist of a long shaft around which a flat strip of metal is wound spirally on edge, when this is revolved in the material the latter is usually pushed along.

Fine powders are best conveyed by the *pneumatic conveyor*, which may operate by suction in exactly the same manner as an ordinary vacuum-cleaner, or by air pressure.

Convocation, the representative assembly of the Church of England clergy of the provinces of Canterbury and York, its original function was mainly to assess taxation. Each convocation consists of two Houses, the upper comprising the bishops, and the lower of representatives of the clergy of each diocese. Its power decayed with the Reformation, but it was revived in the 19th cent., and, within the limits defined by Parliament, is the final authority on doctrine in the Church of England.

Convolvulaceæ, an extensive and highly valuable family of plants, most of which are herbaceous climbers, having large and very beautiful flowers. They are abundant in the tropics, as medicines, they are important.

The roots of *Convolvulus scammonia*, a Syrian species, furnish scammony, jalap is prepared from a resin plentiful in the roots of several kinds of *Exogonium*, a beautiful climber with long crimson flowers.



Convolvulus

and *C. batatas* is the sweet potato the roots of which abounding in starch and sugar are a nourishing food. The dodder and bindweeds are English members of this family.

Convoy an escort of warships to protect merchant ships in times of war from enemy attack. The right of convoy is the right claimed by neutral States that their merchant vessels sailing under convoy should be exempt from visitation (*q.v.*) and search if the commander of the convoy gave his word of honour that no contraband was being carried. Great Britain has never recognised this right and though she withdrew her objection at the Naval Conference of London 1908 the Declaration of London which incorporated the right was never ratified. The convoy system was much used by Britain during the World War as a measure of defence against German submarine attack.

Convulsions, involuntary contractions of muscles which usually are under conscious control due to some disorder of the brain. Examples are hysteria in which consciousness is retained and epilepsy where it is completely lost. Blood poisoning may cause convulsions and in infants it is due to disturbances of the digestive system. Convulsions in infants must be treated by immersing the child in hot water up to the neck while keeping the head cool with wet cloths. This should be followed when consciousness returns by the administration of a dose of castor-oil.

Conway historic Welsh town at the mouth of the Conway R. on the N coast of Carnarvonshire. It possesses several interesting ruins including the 13th-cent castle Cistercian Abbey and St Mary's Church which occupies part of the abbey site. Much of the old town wall is still standing. Excavations have revealed interesting Roman remains. Pop. (1931) 8709.

Conway of Allington William Martin Conway 1st Baron (b. 1866) English art critic was Professor of Art at Liverpool and Cambridge and President of

the Society of Antiquaries. His works on art include *Reynolds and Gainsborough* (1886) *Early Flemish Artists* (1887) *Early Tuscan Artists* (1900) *Albrecht Dürer* (1883). He is equally well known as a mountaineer and author of *The Zermatt Pocket Book* and editor of the *Climber's Guides*. He made ascents in the Himalayas (1891) the Andes (1894) Terra del Fuego and many other districts and published many works describing them—*The Alps from End to End* (1894) *The Bolivian Andes* (1901) *My Indian Memories* (1901). He was MP for the Combined English Universities from 1918-31 when he was raised to the peerage.

Cooch Behar Indian State in NE Bengal. Most of the surface is flat and it is well watered by various tributaries of the Brahmaputra R. For its comparatively small size (1300 sq. m.) it produces a huge rice crop other valuable products are jute and tobacco. The State is partly independent and partly under the advisory governorship of the Governor of Bengal. The capital bears the same name. It possesses a university college. Pop. state 600,000 town 100,000.

Cook, Sir Edward Tynas (1837-1910) English journalist. Editor of the *Pall Mall Gazette* (1890-3) the *Westminster Gazette* (1893-6) and the *Daily News* (1896-1901). Author of *The Press in War Time* (1900) literary essays etc.

Cook, Eliza (1818-1839) English versifier best known for her songs of the home e.g. *The Old Armchair*. She edited *Eliza Cook's Journal* (1849-54). Her verses were collected as *Milk and other Poems* (1838) and *New Echoes* (1864).

Cook James (1778-1799) distinguished English navigator and explorer. In his vessel the *Endeavour* he left England in 1768 for the S. Pacific Ocean. He discovered many S. Sea Islands circumnavigated New Zealand discovered Australia landing at Botany Bay and returned to England at the Cape of Good Hope. In 1771 he set out on a further voyage to verify

the positions of some already known islands, and discovering others. He sailed down into the Antarctic and again returned *via* S. Africa. His



Captain Cook

touched Kamehatka and the Aleutian Islands, and, returning, put in at Hawaii, where he was killed in a fight with the natives.

He wrote accounts of his voyages, which make fascinating records of adventure.

Cook, Sir Joseph (b. 1860), Australian politician. Emigrated from England to Australia, 1885, was elected to the New South Wales Parliament, and served as Postmaster-General, Minister for Mines, and Minister for Defence. He was Prime Minister of the Commonwealth, 1913-14, Minister for the Navy, 1917-20, Commonwealth Treasurer, 1920-1, and High Commissioner for Australia, 1921-7. Represented Australia at the Versailles Conference, 1919, and on the League of Nations, 1922.

Cook, Thomas (1808-1892), tourist agent, born in Derbyshire, worked as a wood turner and printer, and in 1844 made arrangements with the Midland Railway for running tours. From this developed his Tourist Agency, which made his name at the Great Exhibition of 1851 and the Paris Exhibition of 1855, after which he began organising fortnightly tours and gradually extended his activities. The firm of Thomas Cook & Son, now amalgamated with the Wagons-Lits, has travel agencies in every part of the world.

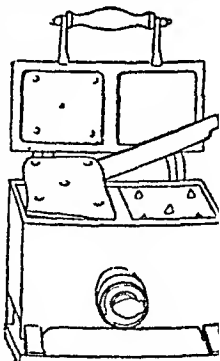
Cookers, Choice of. Electric Cookers

An electric stove is at least as cheap as gas when the cost of electricity is 1d. or less per power unit, and it has the advantage over other forms of not needing a flue outlet, since no fumes are produced in using electric current. Provided it is placed in a position where the smells and steam from cooking can be carried away, no chimney is needed. The idea that boiling is a slow process on an electric hot-plate has probably arisen from endeavouring to use such a hot-plate in the same way as a gas-ring. The gas is turned on when the cooking is begun, and off when it is finished. With an electric hot-plate of the solid enclosed type, the current should be switched on some time (10-15 minutes) before cooking, and turned off the same length of time before serving, as there is usually sufficient heat left in the hot-plate to finish cooking without any current during the last 10 minutes.

A cool kitchen is supposed to be one of the advantages of electric cooking. This is true, in so far as the oven remains closed, or is supplied with an automatic ventilator. Failing these, the kitchen becomes filled with steam every time the oven door is opened.

For the experienced and intelligent cook there is a new type of storage cooker, which is very economical in use, but requires careful regulation. An electric

current is conveyed at an even, steady, and expensive rate, maintaining the hot plate and ovens at a definite temperature. Electric cookers are vying w



Form of Toasting Machine

gas stoves in their installation of a device for controlling the heat of the oven so that food may be left cooking unattended without danger of burning.

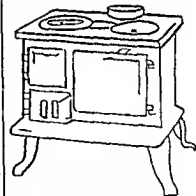
Gas Cookers have been in existence for so many years that it becomes increasingly difficult to introduce improvements. The sides and the door panels are embossed in the latest designs of large cooker and the door panels only in the smaller cookers. This embossing or bulging gives greater oven space without increasing the area of floor space required for the stove in the kitchen. The hinges on the doors have been improved, the pins being hidden from view. This improves the appearance and facilitates cleaning. The door knobs should be easy to grip either eight sided or corrugated. The

bath is 20 gallons) Coal coke or anthracite can be used in these stoves. Some coal usually needs to be mixed with the coke during cook-



Large Cook

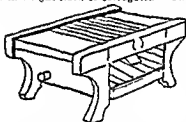
ing especially when much boiling is being carried out. Anthracite has the advantage of burning for a long



Coal-burning Cooker

period without attention (as long as 24 hours if properly stoked).

A range which will burn crude oil has also been devised. It is similar in ap-



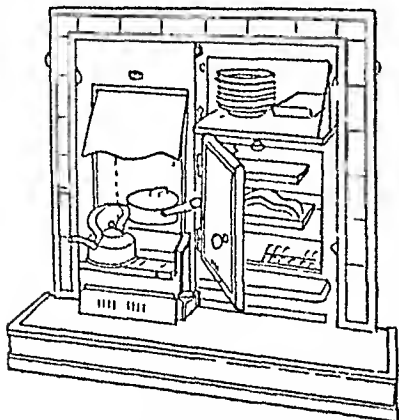
Heavy-duty Cook & Radiator

raised oven which is becoming more easily obtainable at a lower price is a further improvement for those who have to do much cooking. The

bottom flue outlet means that the air-space which used to be under the stove can be done away with. Less gas is required to heat the oven and dishes which only require long slow cooking such as rice puddings can be placed right at the bottom thus saving oven-space.

Coal Stoves. (1) Where a great deal of cooking is to be carried out and there is no other means of supplying hot water a combined water heater and cooker is advisable. The stove illustrated here is capable of heating the water in a storage cylinder of 40-50 gallons capacity (a moderate amount of water for a hot

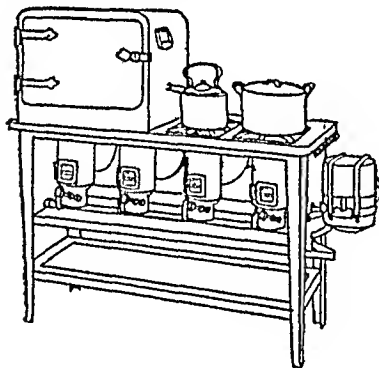
pearance to a coal range, can be fitted in the kitchen alcove, and is suitable for large houses. There is no dust and dirt, no labour is required for carrying



Coal burning Cooking Range

in the coals, and the heat of the oven can be easily controlled.

(2) If the cooking-stove is not required for water-heating as well, the choice lies between one heated by solid



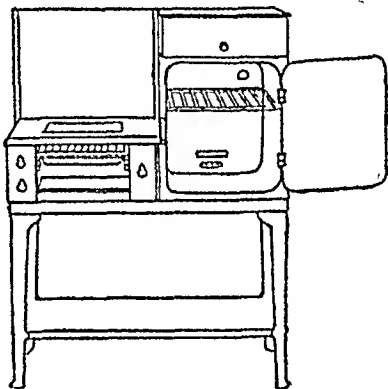
Oil Cooker

fuel or by oil. For summer use only, the oil-stove is preferable, as it is lit only while cooking is in progress. A coal range is usually cheaper to buy,

and can be used as a substitute for an open fire.

For a large household, where economy of fuel is of prime importance, a carefully designed range, requiring only a moderate-sized shovelful of anthracite per day, is suitable. The fire keeps in overnight, and the oven always remains at a suitable cooking temperature. The hot-plate boils quickly, and is ready for use first thing in the morning.

(3) Sometimes, for economy's sake, the housewife wants to heat the water and the room and do the cooking all with one stove. Attractive grates, sur-



Horizontal Electric Cooker

rounded by tiles in harmony with the sitting-room-kitchen, have been designed for this purpose, some having a hot-plate under the oven, others depending upon the open fire for boiling and steaming. Since these grates cope with three forms of heating, too much must not be expected of them.

(4) When the water-heating is carried out by an independent boiler (see WATER-HEATING) and an oil-stove is used for cooking, it is an advantage to have the oven heated by the same fire as the water. This usually maintains a steady, moderate oven temperature, suitable for casseroles and milk puddings.

Oil stoves For cottages and bungalows oil-stoves are excellent giving a hot oven soon after lighting and boiling quickly. A choice must be made between one with a wick and one without. The former requires careful leaning in order to get the blue flame which is so important for successful oil-cooking but on the other hand is rather easier to adjust than the wickless type. An oven which does not lose its heat too quickly tends to keep the kitchen cooler and to economise in oil. Owing to the fact that ovens supplied with oil stoves tend to be somewhat hot it is important in using them to re-heat to a considerably higher temperature (about 100 F) than is required for subsequent cooking. There is otherwise a possibility of having a difficulty in browning cakes scones etc. The oil will not flow freely and easily unless the stove is placed in a level position. This point is so important that some models are provided with a spirit level.

The **haybox** consists of a wooden box filled with tightly packed hay. A hole is scooped out of the centre large enough to hold a saucepan or casserole. A pad of flannel stuffed with hay is placed on top and a hinged lid closed down. Long slow cooking is carried out under these conditions. It is especially suitable for stews dried fruit porridge or broiled meat. A dish which takes 1 hour to cook in the ordinary way will take 4 in the haybox. Some preliminary heating (about ½ hour in the above case) must be carried out and the dish at once placed in the haybox.

A **Spit oven** is the modern form of the spit which used to be employed for roasting. Chops steaks and small game are hung on hooks in a metal utensil which is placed in front of the bars of an open fire. Side pieces prevent the spitting of the food from marking the range and a drip-pan underneath collects the hot fat which runs off.

Cookers Waterless utensils for cooking a whole meal over a small flame

The food cooks in its own steam only a little being added during the initial heating. A thick base attached or separate is provided to prevent burning and a heavy or clamped lid prevents the escape of steam—thus no food value is lost and the cost of heating is extremely small. The food should be carefully wrapped or enclosed in the separate compartments in order to prevent any fainting of flavour.

Cooking preparing food for the table by subjecting it to heat in various ways. In its higher developments it also consists in making food attractive to the eye. Foods can be divided into groups which are similarly affected by heat i.e. by boiling steaming or baking.

- (1) Meat fish eggs and to some extent milk
- (2) Starches such as rice tapioca oatmeal flour etc
- (3) Sugar
- (4) Fats such as dripping butter oils lard
- (5) Vegetables roots greens or fungi (the roughage group)

Meat contains various kinds of proteins each of which reacts differently towards heat. There is one similar to egg white which is soluble in cold water and if present in large quantities causes meat to be tough and coagulates on heating. Another is converted into gelatine on prolonged heating and is soluble in hot water but not in cold. Yet another is only soluble in slightly acidified water and coagulates like egg white on heating. The presence of these various substances in meat explains why some cuts of meat require different treatment in cooking from others. Cuts from the part of the animal which is most exercised for instance contain a considerable amount of fibres which are converted into gelatine on prolonged cooking. Stewing is the longest method of cooking and for this buttock steak is therefore often used. Similarly for short methods of cooking such as grilling and frying parts such as chops and steaks are used which consist largely

of proteins, and merely coagulate on heating. The division between all the different cuts of meat is not quite so clear-cut as this, but it serves to show the reason for treating different joints of meat differently.

cooking, prolonged heating toughens the fibres, making it less digestible. *Milk* On heating, the protein tends to separate out and become entangled in skin, and the lime salts to be deposited at the bottom of the saucepan.

LIST OF JOINTS SUITABLE FOR DIFFERENT METHODS OF COOKING

	<i>Beef</i>	<i>Mutton and Lamb</i>	<i>Veal</i>	<i>Pork</i>
Roasting	Sirloin Fillet Ribs Round (thick side)	Leg Shoulder Saddle Loin	Fillet Loin Neck	Loin Leg Spare-rib
Stewing	Brisket Flank Cheek and neck Tail Clod (cheap stews)	Neck Head Breast Trotters	Breast Neck Knuckle	Feet Spare rib
Boiling	Buttock or round Silverside (salted) Aitch bone Brisket Tongue	Leg Neck Middle and best end		Leg (salted)
Grilling	Kidneys, steaks, chops			
Frying	Kidneys, liver, sweetbreads, steaks, chops			

If too high a temperature is applied to meat, the fibres of which it is composed become hard and indigestible (see TEMPERATURE CHART below).

Eggs Too high a temperature causes the white of the egg to become hard and leathery. It may be immersed in boiling water, but should be then pushed to the back of a range or otherwise kept hot for 6-9 minutes. Similarly, a "boiled" egg-custard curdles if raised to a high temperature, and should, therefore, be cooked over a gentle flame.

A slow temperature should be used in the oven for any mixture which contains a large proportion of egg, such as custards, soufflés, meringues, and a temperature below boiling-point for anything which is cooked in or over water.

Cheese becomes stringy and tough on prolonged heating, and only requires sufficient heat to melt it.

Fish consists chiefly of coagulable proteins, which require only short

The statement that "the skin is good for you" is therefore correct. If the milk is spilt in putting a milk pudding into the oven, this skin which forms on the surface also forms an unpleasant brown film over the edges of a pudding. Another point is that milk evaporates, especially during long cooking. A quantity which appeared sufficient, when placed in the oven may seem alarmingly insufficient on removal.

Gelatine is best dissolved by allowing it to soak for some time in cold water, and then adding boiling water to the swollen grains or sheets.

Starchy Food Flour, rice, potatoes, oatmeal, and other starchy foods, when heated or boiled in water, alter slightly in composition. The starch of which they principally consist is rendered soluble and digestible. If heated in the oven in a "dry" state, as in pastry, the starch in the centre of the pastry cooks in the moisture present, becoming soluble, and that on the outside is converted into a brown compound.

called dextrin which is also soluble and digestible

Sugar If sugar is heated with water it gradually changes from a thin watery solution to a dark-coloured substance known as caramel. These stages and the temperatures at which they occur are important in sweet making.

Fat When fat is heated the water is first driven off causing it to bubble then little change occurs until a faint blue smoke rises at about 200 though it varies according to the fat used. Lard reaches the smoking stage at a lower temperature about 100 which makes it preferable for frying. The lower the temperature at which the fumes are given off the less time it takes to heat and the less gas is used.

Poupage Foods When vegetables are exposed to boiling water or steam the cellulose or tough supporting structure of the plant breaks down and starchy granules if present swell and become soluble and digestible. A similar change occurs with fruits.

TEMPERATURE FOR DEEP FAT FRYING

Food.	Degree F	Time
Potatoes chips	393	4-5 mins.
Fruit etc.	340	3-5 mins.
Fish	340	2-3 mins.
Dough etc.	310	10 min. a.
Veal tarts	350	4-5 mins.
Cooked mixtures	300	1-2 mins.

Cooking Appliances. labour saving devices which assist in the preparation of meals.

Cream Maker This makes cream at about half dairy price. Equal quantities of melted

butter and milk are poured into the receptacle and the handle pumped breaking the butter into small particles and mixing it thoroughly with the milk in



Cream Machine.

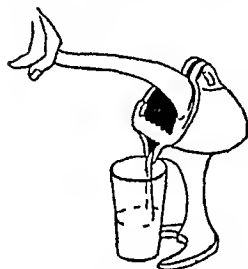
TEMPERATURE AT WHICH FOODS SHOULD BE COOKED AND TIME REQUIRED

Boil or Roast

Food.	How	Degree F	Average time
Bread	Hot 1 mod.	425-450	45-60 min.
Plain cake	Mod. rat.	350	2 1/2 hrs. small 4-5 hrs. large
Scones	Hot 1	425	10-15 mins.
Gingerbread	Slow	340	1 1/4 hrs.
Meringues	Slow	300	1 1/2-2 hrs.
Sponge cake	Moderat.	350	2 1/2-3 hrs.
Biscuits	Mod. rat.	350	10-15 mins.
Shortbread	Mod. 1 1/2 w	350	1 1/2 hrs.
Swiss roll	Hot 1 mod.	400-425	8-15 mins.
Small cakes	Moderat.	340	20-30 mins.
Small tarts	Hot 1	410	10-15 mins.
Fruit pies	Hot	425	45-60 mins.
Yorkshire pudding	Hot	450	45-60 mins.
Fish	Slow	340	(1 1/2 min. a. pe. lb.)
Cheese dishes	Slow	320	10-20 min.
Egg dishes	Slow	320	10-20 min.
Soufflés	Slow	320	10-20 min.
Rough puff pastry and pie	Hot	425	45-60 mins.
Beef	Hot 1 1/2 mod.	450-475	See R. ASTING
Pork	Hot to mod.	300-375	
Mutton	Hot to mod.	400-450	

This varies according to the size and thickness of the food being cooked, and cannot be definitely

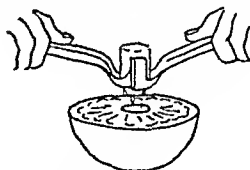
appearance and taste the product is undistinguishable from fresh cream. The cream can be whipped after 2 or 3 hours in a refrigerator, or after 24 hours at ordinary room temperature. The food value of reconstituted cream is the same as that of fresh.



Instant Juice Press

Beans can be sliced in an inexpensive machine. Another machine slices beans only, two at a time being fed into the container where they are chopped by revolving blades.

Graters The simple hand grater has been superseded by a rotary grater turned by a handle. The food is held in place by a block of wood,



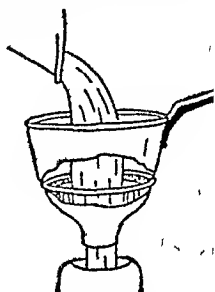
Grapefruit Corer

so that there is no danger of injury to the fingers. **Fruit Stoners** A small punch has been developed to push the stones out of cherries, leaving little sign of their removal. A larger punch removes the stones from plums, apricots, and olives.

Fruit Juice Extractor Special diets and cooling drinks require a considerable amount of orange juice, and a mechanical form of the ordinary lemon squeezer has been adapted for citrus fruits. Grapes, pineapple, and most other fruits can be squeezed in a device which crushes the fruit, draining the juice away from the crushed pulp and skin.

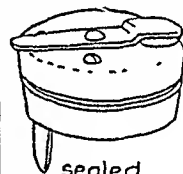
Straining and puréeing One good type of puréeing or straining machine

resembles an upturned sieve, with a roller rotated by a handle, pressing the food through. Another model is like a mincer, with tubular perforations through which the purée passes out, skins, pips, and stones being ejected from a pipe.

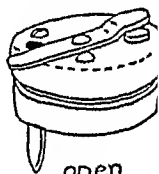


Filtering Funnel

Grapefruit Corer For breakfast purposes grapefruit is prepared with



sealed



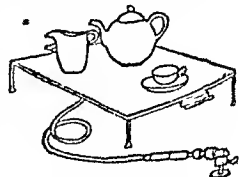
open

Milk Pourer

a special thin-bladed and sharp serrated knife, but when served as an hors-d'œuvre, the core is usually removed, and a cherry placed in the centre. A good corer consists of two perforated curved blades, which are pressed down into the grape fruit, and rotated.

Filtering Funnel A filtering funnel with removable

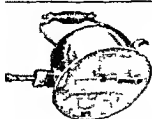
tinned sieve is very useful for pouring tea and coffee.



Warming Stand

Milk Bottle Pourer Several devices have been invented to help the pouring of milk from delivery bottles. One has a sharp point to remove the card-

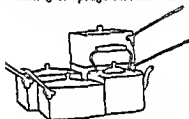
ard cover and fits the bottle neck tightly with a rubber washer. A long type incorporates parts which can be used for lemon quering cream and



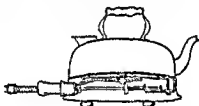
able the milk to be poured smoothly and accurately. white of egg whipping and mayonnaise mixing.

Cake Mixer The creaming of butter and sugar for cake making or the beating of sponge mixtures is a

Cooking Utensils must be easy to clean, unturnishable in the air, unaffected by the acids which are found



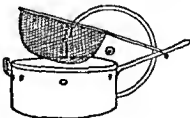
Sq ar Set of Stew Pans



Elect Kettle



Frying Saucepan

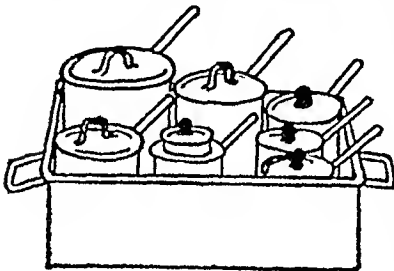


Frying Pan

laborious process and both mechanical and electrical mixers have been devised the latter more especially in some foods and if they are to be put on the table must look attractive. The old copper saucepans had all the

faults suggested above they dulled on exposure to air, and required much cleaning, acid fruits liberated poisonous copper salts, and a cooking utensil which was sufficiently attractive to be put on the table was almost unknown.

After copper, iron utensils became common. These tended to rust and deteriorate. To prevent this they were tin-lined, but the tin sometimes melted and the iron thus exposed rusted. The next step was to enamel them on the inside, thus preventing the discoloration of foods. The introduction of aluminium, light in weight and rustless, was a boon to those who had groaned under the weight of iron utensils. But there were drawbacks. Soda, which is so valuable for washing



Bain Marie Set

greasy utensils, could not be used, for it destroyed some of the aluminium, and the thinner, cheaper utensils buckled with heat and became unshapely. However, stainless steel products are gradually solving all problems, and with the lowering of price will find their way into many households. This is true also of fire-proof glass and earthenware.

Cook Islands, scattered Pacific archipelago W of New Zealand between longitude 157° and 160° W. The principal islands are Rarotonga, Mangaia, Aitutaki, and Atiu. They are fairly fertile, and produce crops of fruit, coconuts, and coffee. Since the beginning of the 20th cent they have been a New Zealand dependency. With other small Pacific islands which

are united to them for census purposes, their area is 280 sq. m., pop (1926) 13,877.

Coolgardie, gold-mining town in W Australia, c 350 m E by N of Perth. Gold was discovered here in 1853; the production has since fallen off considerably. Pop c 3000.

Coolidge, Calvin (1872-1933), 30th President of the United States. He was born at Plymouth, Vermont, and studied law at Amherst College. He practised in Northampton, Massachusetts, served as Republican in local legislatures, became State Senator in 1911, Lieutenant-Governor of Massachusetts from 1916 to 1918, and finally Governor in 1919-20. He was elected Vice-President in 1920, becoming President on Warren Harding's death (Aug 1923). He was re-elected in Nov 1924. As President Coolidge opposed tariff revision, advocated economy, abstention from the League of Nations, and adherence to the World Court. He retired in 1928 after earning a reputation for extreme taciturnity.

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Coon-can, a card game for any number of players from 2 to 7, derived from an old Spanish game called *Conquian*. A full pack of 52 cards is used, with 2 jokers, which may be counted as any card. Ten cards are dealt to each player, one at a time, the remainder, placed face downwards, forming a "stock". The top card of stock is turned up and placed on the table. The object is to form combinations of 3 or more cards of the same denomination, or sequences of cards of the same suit. When made, these combinations are "shown down", i.e. laid face upwards on the table. Each player in turn either draws a card from the top of the stock, or takes the exposed card; he may then "show down" any of the combinations.

ie may hold after which he discards one card laying it face upward on top of or in place of the card or cards already exposed. The player who first gets rid of all his cards wins the others paying the value of the cards remaining in their hands. A joker counts 10 aces 11 court cards 10 and the other cards their face value. In addition to showing down cards may be added to combinations already on the table. For sequences the ace counts either as 1 or as above the king.

Cooper Anthony Ashley see SHAPTESBURY 1st EARL OF

Cooper Sir Astley Paston (1768-1841) English surgeon, was appointed surgeon at Guy's Hospital in 1800 and F.R.S. in 1802. He carried out important research work on hernia and became so famous that his practice yielded him £21,000 a year. He attended George IV in 1830 and was made a baronet 1831. He published works dealing with fractures and also with diseases of the breast.

Cooper Gladys (b 1898) English actress made her debut in *Blindfold* in *Fairyland* (1905). She played first in musical comedy and later in serious plays. She has appeared successfully in *The Admirable Crichton*, *The Second Mrs Tanqueray*, *Magda*, *Fi*, *third The Rats of Norway* etc. and took over the Playhouse Theatre in 1927. Married first H. J. Buckmaster (marriage dissolved) second (1938) Sir Neville Arthur Pearson Bart.

Cooper James Fenimore (1797-1851) American novelist wrote many adventure stories of pioneers and Red Indians. They include *The Pilot* (1823), *The Last of the Mohicans* (1826), *The Pathfinder* (1840) and *The Deer Slayer* (1841). His novels were widely popular and were praised by such men as Victor Hugo and Balzac.

Cooper Samuel (1809-1867) English miniature painter. Cooper enjoyed the reputation of being the greatest artist of his time in his own field and his miniatures are still considered the best ever painted in this country. He was trained by his uncle John Hoskins

himself a miniaturist. Oliver Cromwell and Mrs Samuel Pepys were two of his most famous sitters. The greater part of his work is in private collections in England notably at Windsor Castle.

Coopersage, the making of wooden vessels by binding strips or staves of wood with hoops to form cylinders circular heads at one or both ends fitting into grooves in the staves. The highest grade product is the cask for holding liquid which is given a bulge or belly in the middle thereby strength and convenience of handling are greatly increased. This requires very accurate fitting to be liquid tight. It is used chiefly for wine and beer also for oils though metal drums are now displacing it for this purpose. Casks which do not require to be liquid tight (slack casks) are made in the same manner as tight casks sometimes by machinery. The staves of casks are bent to shape by heating and drawing together by a rope operated by a winch. The tight cask is held together with strong iron hoops forced on after the heads are in position. Cylindrical barrels and casks are also now made from three ply wood but can be used only for dry material.

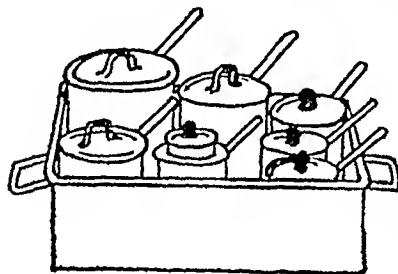
White cooperage deals with the manufacture of churns tubs and similar open vessels in which the staves are not bent.

The great advantage of the barrel construction lies in its being made up of a number of parts which can give lightly in respect to one another but from the manner in which they are held together tend to recover their normal position. This makes the construction eminently suitable for rough handling and it is largely used for shipping heavy material such as cement chemicals salted fish and small castings. Barrels can also be disassembled for transport when empty thus greatly saving space.

Co-operative Movement. Co-operation in its modern special sense signifies a trading system in which consumers band themselves together

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- * In Germany in 1924 600 agricultural co-ops including 19 000 purchase and sale 100 dairies Denmark 100 creameries 40 bacon 1 large number of central co-operations Farmers buy 1 rye seed etc through societies and market in the same way binding 1 send their produce only 1 body The produce is in commodity classifications 1 Australian wheat pools the same idea on a large

- t on among British farmers 1 v and sporadic largely 1 great variety of crops and The Agricultural Organisation was founded in 1901 but success Agricultural co-ops has been encouraged by the Marketing Board (q.v.) 1 free principal types of agriculture co-operative societies in the kingdom are Requirement which supply seeds manures etc Produce Societies 1 market members produce and societies which give some service as threshing All these have declined by c 30 per cent per and membership since the start of 190 The Produce 1 in 1931 included 88 dairy 1 56 egg and poultry societies 1 and market garden produce 1 41 farmers and growers 1 19 miscellaneous produce and 57 fishermen's trading The following figures are

Year	Members	Sales £	Expenses £
1927	7 117 711	173 800	
1930	4,304 784	47 300	
1931	—	4830	
		include milk and dairy 1 poultry £651 000 1 wool £ 8 000 1 fruit and market	

garden produce £149 000 and fish £87 000

Co-ordination Compounds (chem) a group of complex inorganic compounds formed in large numbers by metals of the eighth group of the periodic table. Of no practical importance they are of great theoretical interest on account of the points they raise with regard to theories of valency (q.v.) Many of them are optically active

Coorg small prov of British India S W of Mysore The surface is mountainous with deep river valleys and plateaux the highest point is Tadiandamol (5730 ft) There are several rivers and a large rainfall and the vegetation and jungle are luxuriant Native products include rice rubber coffee and sandalwood The Coorgs and the Yeravas are the most numerous of the several native tribes The chief town and centre of government is Mercara Coorg was taken over by the British in 1834 owing to the barbarity and misrule of the native prince Area 1580 sq m pop (1931) 163 000

Coot, a bird of the rail family black in colour but with a white horny patch on the forehead Mainly a water bird it frequents marshes and lakes and makes its nest which may contain as many as 10 eggs of reeds and rushes The various species are widely distributed

Coot shooting as a sport is practised more extensively in France than in England

Coote Sir Eyre (17 6-1 83) British general Served against the Jacobites 1 4 and later in India Assisted Clive at Calcutta and at Plassey 1 757 In the campaign against the French in the Carnatic Coote won the battle of Wandewash 1 80 and was with Monson at the siege of Pondicherry 1 81 Returned to England 1 79 and was again sent to India as Commander in Chief 1779 He defeated Hyder Ali successively at Porto Nuovo Pollilur and Sholingurh 1 81

Copaiba [from *xōpā'na*] a mixture chiefly of a resin and a volatile oil

to supply and even to manufacture the commodities which they need.

The movement was started by Robert Owen (*q v*), a large-scale mill-owner in the early decades of the 19th cent., who championed the cause of industrial reform, and later the idea of a society of small self-dependent communities. He founded in 1821 the London Co-operative and Economical Society, an association of people buying at cost price in their own store and employing their own members. The plan failed, but was repeated all over the country, still with little success.

In 1844 the "Rochdale Pioneers" made the experiment of charging normal prices, and then crediting members with a claim on profits in proportion to their purchases. This system proved successful and spread rapidly, being fully legalised by an Act of 1852, while a further Act of 10 years later permitted local co-operative societies to federate into a body, afterwards known as the Co-operative Wholesale Society. The emphasis was thus changed by the pioneers from producers' co-operation to consumers' co-operation, which name the English system has since commonly borne.

The individual local societies remained autonomous, and grew rapidly in number, while varying in size from the village co-operative of a few score members to the London Society with a quarter of a million. The number of societies reached a peak of 1455 in 1903, since when amalgamation has steadily increased their average size while reducing their total to 1210 in 1930. Membership in England in the latter year was almost $5\frac{1}{2}$ millions, or $14\frac{1}{2}$ per cent of the total population.

Meanwhile, the Co-operative Wholesale Society supplied most of the local societies, though it had no monopoly of this market. Its capital was subscribed in small sums by these societies, whose delegates appointed directors and other officers. Its activities gradually spread from wholesale buying and distributing to manufacture (boots in 1873, soap in 1874), agricul-

tural land-holding, insurance, welfare work, and education. It now employs 50,000 men, has a share capital of almost £10 million, annual sales of £80 million, and an annual surplus of over £1½ million. It participates in 50 industries, owns 30,000 acres of farming land in Great Britain, and 35,000 acres of tea-plantations in the E.

A political Co-operative Party was founded in 1918 to represent the interests of the movement, and returned one candidate out of 10 to Parliament in that year. A steady improvement was maintained, and 10 members were elected in 1920, this number being reduced to 1 in the election of 1931. The Co-operative members work in conjunction with the Labour Party.

The "disposable surplus" registered by Co-operative Societies was not regarded as profit, and was therefore untaxed up till 1933, when this treatment was modified.

There are now co-operative organisations in some 30 countries all over the world, of which 26 are members of the International Co-operative Wholesale Society. The system is adapted to local conditions, and takes many varied forms, the principal distinction being between consumers' and peasants' co-operation.

One weakness of the consumers' Co-operative movement is that the idea of individual responsibility and interest tends to decrease steadily with the increasing size of the organisation. Above a certain size the co-operative society tends to lose its peculiar position and outlook and to approximate more towards the ordinary large-scale joint-stock concern. The tendency for small co-operative groups to amalgamate into larger units would appear to accelerate this process.

Agricultural co-operation differs from consumers' in that it is co-operation for marketing instead of purchase. This is particularly strong in Germany and especially in Denmark, which relies on its expert marketing of dairy produce for a large part of its

Co-operative Movement

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Copaiba and fish

foreign trade In Germany in 1924 there were 38 000 agricultural co-operative societies including 19 000 rural banks 4700 purchase and sale societies and 3500 dairies Denmark in 1920 had 1100 creameries 40 bacon factories and a large number of central and export associations Farmers buy their machinery seed etc through co-operative societies and market their produce in the same way binding themselves to send their produce only to the central body The produce is pooled in commodity classifications Canadian and Australian wheat pools demonstrate the same idea on a large scale

Co-operation among British farmers has been slow and sporadic largely owing to the great variety of crops and products The Agricultural Organisation Society was founded in 1901 but had little success Agricultural co-operation has been encouraged by the Empire Marketing Board (qv)

The three principal types of agricultural co-operative societies in the United Kingdom are Requirement societies which supply seeds manures machines etc Produce Societies which market members produce and Service Societies which give some service such as threshing All these have declined by c 30 per cent in number and membership since the war year of 1920 The Produce societies in 1931 included 88 dairy societies 56 egg and poultry societies fruit and market garden produce societies 41 farmers and growers societies 19 miscellaneous produce societies and 57 fishermen trading societies The following figures are for 1931

	No. of Societies	Members	Sales £	Stock £
Requirement societies	235	2,027	7,117,771	173,368
Produce societies	29	23,303	4,269,756	47,366
Service societies	815	163,647	—	4829
Produce sales include milk and dairy				
100 000 eggs and poultry			£6,100 000	
1 meat			£41 000	
stock			£208 000	
fruit and market				

garden produce £149 000 and fish £97 000

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Copaiba (from κόπαλα) a mixture chiefly of a resin and a volatile oil

Copley c 1530 Fearing the prejudices of the time he refrained from publishing the work for 13 years till persuaded by his learned friends he dedicated it to the Pope and passed it through the Nuremberg Press

Copley John Singleton (1737-1815) English painter of Irish descent but born at Boston where he first began his career as a portrait painter. He travelled to Italy in 1764 and later settled in London. He became an R.A. in 1779 and his paintings particularly *The Death of Chatham* in the Tate Gallery were very popular. Lord Lyndhurst (q.v.) was his son.

Coppard, Alfred Edgar (b 1878) English poet and author of short stories. His poems are published as *Pelagia and other Poems* (1906) and *Collected Poems* (1919). But he is better known for his stories e.g. *Adam and Eve* and *Pinch Me* (1921) and *Wise as the Quin* (1931).

Coppée, François (1842-1908) French poet dramatist and author of short stories and novels. His collected poems appeared in many volumes notably *Le Cœur et la Jeune* (1874) and *Poèmes et Poésies* (1880). Of his plays *Les Bijoux de la Dernière* (1890) is the best known. His stories include *Le Cœur et la Jeune* (1890) and *Le Coupable* (1896).

Copper For the characteristics of copper see the article ELEMENTS

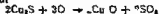
Copper is a metallic element found abundantly in nature in the native state. The main copper-containing ores are copper pyrites which is a mixed iron and copper sulphide, *cuprite* which is cuprous oxide, *malachite* a basic copper carbonate and *azurite* which is cuprous sulphide.

Copper mines are worked in all parts of the world. The principal are in the United States (round the shores of Lake Superior) Chile Spain and the Belgian Congo. Copper is also found in small quantities in a large number of living organisms both animal and vegetable. In the case of certain marine animals such as the cuttlefish copper occurs in the blood pig-

ment *haemocyanin* which acts as an oxygen-carrier similar to the haemoglobin (containing iron) in the blood of mammals.

The extraction of copper from the native metal is not often now accomplished. The usual method is to make the mineral the anode of an electrolytic cell and thus obtain the copper in a state of purity on the cathode. In the majority of cases however copper has to be extracted from its ore which often contain iron and sulphur. The first step is to roast the ore so that the iron is converted into its oxide whilst the copper is still combined as cuprous oxide. The roasted ore is then transferred into another furnace mixed with sand and fused. The fused silica (i.e. sand) dissolves the iron and leaves the copper unaffected in the lower layer. The copper product obtained by this method is known as coarse metal. The process is repeated and a product called fine metal is obtained this latter being a nearly pure cuprous sulphide. This is then roasted in a furnace with an abundant supply of air with the result that the sulphur is partially removed with the formation of cuprous oxide which then reacts with the remaining cuprous sulphide to give copper.

The following are the reactions that occur



In the case of copper ores consisting of the oxide or the carbonate the above somewhat elaborate process is unnecessary and the metal can be obtained by the reduction of the ore with carbon (coke). The metal obtained by the above methods from the ores still contains a small percentage of impurities and has to undergo refining. The first stage is accomplished by *poling* which consists in stirring the molten metal with green poles whereby the oxide present is reduced to the metal the latter being obtained up to 98 per cent pure. Since copper for industrial purposes

must be quite pure, it is subjected to further refining by the electrolytic process, by which almost all the copper produced to-day is refined

Copper is a tough and malleable metal of a red colour. It finds a very large number of applications in the industries and arts. The principal consumer of copper at the present time is the electrical industry, to which, by virtue of its high electrical conductivity, the metal is invaluable. Copper conducts electricity better than any other substance, with the exception of silver. Copper is used in the manufacture of a large number of alloys, the principal of which are *bronze* (copper-tin) and *brass* (copper-zinc). These are described under their own headings.

Copper Compounds. The importance of copper compounds in industry is secondary to that of the metal itself. The most important from the technical point of view is copper sulphate, CuSO_4 , which is used in the form of its solution for a considerable number of purposes. As already mentioned, copper sulphate solution is the electrolyte used during the electrolytic refining of copper, and it is also used in the process of *electrotyping*, which consists in covering an object with graphite to render it conducting and then depositing copper on it by making it the cathode in an electroplating bath, after which the copper shell may be removed and filled with metal.

Copper sulphate is poisonous, and is used as an insecticide and weed-killer. A solution of copper sulphate containing slaked lime is known as *Bordeaux mixture*, and is used to protect potatoes from disease.

Copper Glance, also called *Chalcocite* or *Redruthite*, a very valuable copper ore, though not so abundant as copper pyrites (*qv*). In composition it is sulphide of copper, usually with traces of iron. It is sometimes crystalline, but usually occurs in fine-grained masses, lead-grey in colour, which tarnish to blue or black. It is

widely distributed, yielding most of the copper supply of the United States, where it is often a derivative of copper pyrites. It is found also in veins and beds in Cornwall, Norway, Italy, Siberia, Mexico, and S America.

Copperhead, a very venomous N American viper, conspicuous for its coppery hue relieved by broad reddish-brown bands.

Copper Plating, *see* **ELECTROPLATING AND ELECTROTYPING**

Copper Pyrites [*PRIT'S*], or *chalcopyrite*, sulphide of copper and iron. It is distinguished from iron pyrites by its more golden-yellow colour and iridescent surface, and by being much softer. It occurs in crystals, but is usually massive. It is the most widely distributed ore of copper and the chief commercial source of the metal.

Coppersmith, a S Asiatic bird of the barbet family, so called from the resemblance of its note to the sound produced by hammering metal.

Coppice, a small plantation of trees which are cut over periodically, before they become timber-trees, furnishing poles, rods, brushwood, tanning bark, osiers, etc. Any kind of broad-leaved tree is suitable. Conifers are useless, as they do not regenerate themselves in the required manner. Sweet chestnut was formerly grown for hop-poles and oak for wheel-spokes.

Copra, the dried flesh of the coconut which is the fruit of the coco palm *Cocos nucifera*. Copra is produced in enormous quantities in Ceylon, India and the Pacific Islands. Some of it is used locally for food, but the far greater proportion is shipped to Europe or America, where it is used for the manufacture of coconut oil (*qv*) which is obtained from it by expression and, more rarely, by solvent extraction. The de-oiled material is used for food and in confectionery.

Coprolites, the fossilised excrement of reptiles. They occur in the form of nodules, especially in the Liassic beds, and contain much phosphatic material. Generally speaking, however, the term has come to mean

phosphatic nodule. Formerly coprolites were of economic value to the artificial manure industry.

Coptic Language, a Hamitic language (qv) descended from ancient Egyptian but extinct since c. A.D. 1700. It was written in Greek characters.

Copts the native Christians of Egypt supposed to be descended from the ancient Egyptians. The name is derived from a Greek term applied to the Egyptians. Their history is identical with that of Christianity in Egypt which according to Coptic tradition came to that country direct from St Mark. They were early followers of the Monophysite heresy, which led to their condemnation by the Council of Chalcedon in 431 and a prolonged and bitter struggle with Rome. The Copts eventually enlisted the aid of the Mohammedans who invaded Egypt in 640 and waged a war of extermination on the orthodox Christians as well as inflicting serious damage on the Coptic Church itself.

The Copts preserve many ancient practices and forms of prayer and these have been exhaustively studied in recent years. The people are mainly concentrated in the larger towns and are regarded as intellectually superior to the rest of the native population.

Copyright, *see* **Taxation**.

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e.g. gramophone records cinematograph films etc. It follows that there can be no copyright in ideas but merely in the particular expression of ideas.

Copyright is reserved to the author who may assign his right either wholly or in part or grant any interest therein by licence provided the assignment or grant is made in writing signed by the owner or his agent. Though dramatic or musical performance is not a publication the right to perform a work is expressly included in copyright. The Act covers all British dominions save the self-governing Dominions which may however adopt the Act with or without modifications.

Copyright endures for the life of the author and a period of 50 years after his death but in the case of a published work any person may after 25 years reproduce the work on giving written notice to the owner of the right and paying him 10 per cent royalties on the published price. Infringement of copyright is the doing of anything which the owner has the sole right to do.

The definition is simple but often difficult to apply. Thus it has been held that for a shop-keeper or restaurant proprietor to provide a wireless loud speaker for the benefit of his customers is an infringement of copyright in regard to all copyright matters broadcast and this although he holds a wireless licence. But there is no infringement in any fair dealing such as quotation with any work for purposes of study research criticism review or newspaper summary nor in the reading or recitation in public of any reasonable extract from a published work again it is permissible to publish in a newspaper a report of a public lecture unless the report is expressly forbidden by conspicuous notices in the lecture-hall. The remedies given for infringement are an injunction damages or an account of profits or an order for the

any action must be begun within 3 years of the infringement

International Copyright By the Berne Convention, 1887, as subsequently amended, the signatories formed themselves into a Union, and accepted the principle that authors of any of the countries of the Union or their representatives should enjoy in the other countries the rights which these countries gave to their own subjects. Citizens of non-Union countries who first publish their works in a country of the Union shall have in that country the same rights as native authors. Thus, international copyright depends, in the case of an unpublished work, upon the nationality of the author, in the case of a published work, upon the nationality of the work. In addition, of course, any country may make particular copyright treaties with another, and in England this is specifically provided for in the Act of 1911 which, by Order in Council, may be made to apply to works published abroad, foreign authors, or British subjects resident abroad if the foreign country in question has undertaken to give reciprocal protection.

Coquelin, Benoit Constant (1841-1909), French actor. His first big success was as Figaro at the Comédie Française, Paris, in 1861. He became director of the Porte Saint Martin, 1897, toured U.S.A. with Sarah Bernhardt, 1900, and was made Officier de l'Instruction Publique and of the Legion of Honour. He wrote *L'Art et le Comédien* (1880), *Les Comédiens* (1882), and *Tartuffe* (1884). His brother, **ERNEST ALEXANDRE HONORÉ COQUELIN** (1848-1909), and his son **JEAN COQUELIN** (b. 1865), also made names on the stage.

Coracle, a light skiff made by covering a wooden frame with tarred skins, commonly used by the ancient Britons and still occasionally in Wales.

Corallian, see JURASSIC SYSTEM

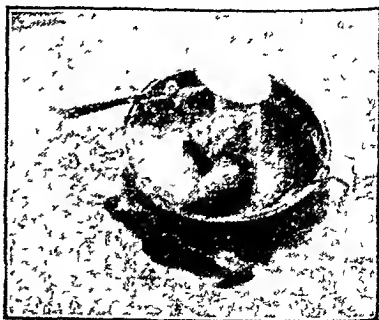
Corals, marine animals of the Phylum Cœlenterata (qv), related to sea anemones, but differing in being usually colonial, and in secreting a

calcareous skeleton which is wholly external, and closely follows the structure of the coral polyp. This skeleton consists of a cup, or *theca*, from which the polyp projects, and into which it can withdraw, and radiating inwards from the walls of the cup are a number of vertical plates called *septa*. As the cup grows in height the polyp ascends, and forsakes the lower, older parts of the cup. In compound forms the cups are often connected.

Of simple forms the best known are the Devonshire cup coral, and the mushroom coral of tropical seas, so called from the resemblance of the *septa* to the gills of a mushroom.

The compound corals are more plentiful than the simple, or solitary. In the madreporal coral the polyps produce many buds, and it and allied forms are important reef builders. There are two chief types of massive compound coral, the star corals and the brain corals. The former are among the principal reef-builders. They do not branch, but form solid mounds, the polyps being cemented together, yet remaining distinct. In the brain corals the polyps are not completely separate, but open by different mouths into the grooves, which traverse the surface of the coral.

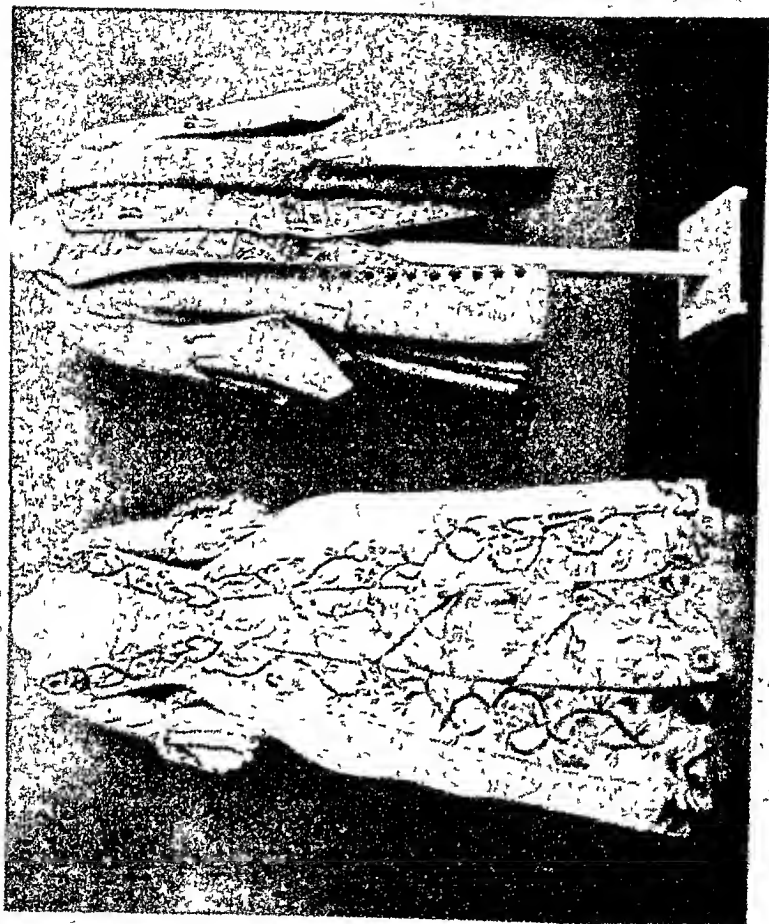
The term "coral" is given to some closely related forms which are not, however, true corals. The organ-pipe coral is composed of a mass of tubes,



Fishing in Indo-China from a Coracle



ENGLISH COSTUME CHARLES II



18TH CENTURY ENGLISH COSTUMES

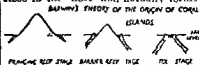
more or less parallel and united at intervals by transverse platforms. The black coral is common on the Great Barrier Reef of Australia and is of economic importance most of it being exported to India. The red coral of the Mediterranean is however the most valuable commercially. It was worn in the days of the Romans as a charm and this practice is continued in Italy even to-day. The principal area for its collection is off the N coast of Africa where the French control the work.

Fossil Corals have been plentiful throughout geological history when ever clear water conditions prevailed. They are especially abundant in the Carboniferous limestone where they are valuable fossils for zoning the beds and are also richly deposited in the Wenlock limestone. The particular group to which these forms belong the *Tetracoralla* so-called from the septa originating in groups of four is now ever completely extinct.

Coral Reefs and Islands. For reef formation coral polyps require a good foundation to build on and water of a suitable temperature. Generally speaking reefs are not found where the temperature is below 0°F or where the annual variation is more than 12°F or at a depth of over 20 fathoms.

Corals avoid the great river estuaries where the water is fresh and muddy and reefs are mostly found in the centre and on the W side of tropical oceans but under the influence of the Gulf Stream extend as far N as the Bermudas. Growth is best in the Gulf of Mexico the W

structure—the fringing reef barrier reef and atoll. The fringing reef is close to the shore and actually forms



on the seaward slope of the land and gradually widens towards the sea. The barrier reef usually runs parallel to the coast at some distance from land and often dips steeply to great depths on the seaward side but encloses a quiet shallow lagoon to landward. The best example is the Great Barrier Reef of Australia off the Queen land coast which is 100 m long. Both barrier and fringing reefs are found round many of the Pacific volcanic islands.

Atolls. The atoll is a reef which forms a complete ring but has no land in the centre. The Maldives and Laccadives and the Keeling-Cocos group are typical. This type of reef is long and narrow and does not rise high out of the water. The conversion of the reef into a habitable island is supposed to be due to the waves pounding up dead coral into sand which is converted by percolating water into solid limestone. On this beach drifting pumice from volcanic outpourings becomes stranded together with other debris and disintegrates into clay which forms soil. Plant seeds settle on the island birds follow as soon as there is enough vegetation and the island assumes the usual features.

Coram, Thomas (c 1668-1751) a Dorsetshire seaman. He established the Foundling Hospital (qv) which was chartered in 1739 and intended as a refuge for the numerous unwanted children of London. He spent all his money on charities and towards the end of his life was reduced to poverty when an annuity was raised for him by public subscription.

Corbett, James John, Gentleman Jim (1866-1933) American boxer



Cor 1

Pacific, and the W Indian Ocean. Corals build three distinct kinds of

beat John L. Sullivan (*q.v.*) for the Heavyweight Championship of the World in 1892, but was knocked out by Bob Fitzsimmons (*q.v.*) in 1897

Coreyra, *see* CORFU

Corday, Charlotte (1768-1793) French revolutionary, assassin of Marat. She became interested in politics on the outbreak of the Revolution, and mixed with the Girondists in Caen after the party's downfall (May 1793). Believing Marat to be a tyrant, she went to Paris in July 1793 and stabbed him in his bath. She was tried and guillotined.

Cordeliers: (1) A French nickname for the Franciscans (*q.v.*) (2) Name of a Society formed in 1790, with Danton as first president, to oppose actively the old régime in France. It became more extreme as the revolution proceeded. It was so called because it was formed by members of the Cordelier district. Marat, Hébert and Camille Desmoulins were other leading members.

Cordite, an explosive manufactured by mixing together gun-cotton and nitro-glycerine and dissolving the mixture in acetone, about 5 per cent of vaseline is added to stabilise the mixture. The pulp obtained is expressed in the form of thick threads (cords) and the acetone is evaporated off. Cordite is used as a propellant for projectiles. *See also* EXPLOSIVES

Cordon, a line of military posts or policemen placed around a district, a house, etc., in order to prevent communication between it and the parts beyond. *Cordon bleu* originally denoted the blue ribbon worn by the Knights Grand Cross of the Order of the Holy Ghost, the leading order of royalist France, but nowadays is humorously applied to good cooks.

Cordova - (1) Province of S. Spain. In the N. are the Sierra de Morena, the centre and S. are fertile and well-populated plains, the Guadalquivir is the principal river. Agricultural products, wine, grain, fruit, and oil, horses and sheep are reared. Minerals

in the Sierra include coal, which is of great importance, copper, zinc, and salt. Among the larger towns are Cordova, the capital of the province; Montoro, Baena and Lucena. Area 5300 sq. m., pop. 710,000. (2) Spanish town, capital of the province of Cordova, a picturesque Moorish type of city, situated on the R. Guadalquivir. Its outstanding piece of architecture is the cathedral, formerly a mosque built in the 8th cent. The ancient leather industry has declined. Modern industries are textiles, brewing, copper, and the town is noted for its silver work. Cordova, believed to be of Carthaginian origin, was held by the Romans in the 2nd cent. B.C. They were followed by the Visigoths and the Moors, who made it their Spanish capital. The Moors were dispossessed, and the town became Spanish in the 13th cent. Pop. 83,000.

Cordwainer, a worker in cordwain, a Spanish shoe-leather made of goat-skin or split horsehide, used throughout Europe in the Middle Ages. The term survives as the name of a London City Company, "The Cordwainers and Cobblers," incorporated under Henry IV, 1410 and confirmed by Mary in 1558, and Elizabeth in 1562. Cordwainer Ward is one of the 26 wards of the City of London.

Corelli, Marie (1864-1924), English novelist, first made her name known with *The Romance of Two Worlds* (1886). Her works are superficial and of little literary merit, but she enjoyed great popularity. Others of her novels are *Ardath* (1889), *Barabbas* (1893), *The Sorrows of Satan* (1895), and *The Mighty Atom* (1896).

Co-respondent, the person charged with adultery jointly with the defendant spouse on a petition for dissolution of marriage (*see* MARRIAGE). Also denotes a joint defendant to an appeal.

Corfe Castle, ancient village in the Isle of Purbeck, Dorset, 5 m. E. of Swanage, near which is a ruined castle said to have been built by King Edgar in the 10th cent. King Edward the Martyr was slain here (978).

Corfu (*Aerhva*) Greek island off the N W coast chief of the Ionian Islands. The surface is mountainous though there are fertile plains in the S where olives grapes oranges and all S European fruits and flowers thrive. The city of Corfu is situated on the E coast. The palace and local antiquities are interesting. The island was formerly a Corinthian colony and had close political relations with Athens. In later times it has been held by Venetians French British (as part of the Protectorate of 1815-64) and finally Greeks. Area 360 sq m pop island 106 000 city 3 000 (19 8).

Coriander a plant belonging to the family Umbelliferae having a tall branching stem bearing large variously cut leaves and a tiny whitish flower. The seed is used as one of the principal ingredients of curry powder. *See also* SPICES AND CONDIMENTS.

Corinth, a small Greek town in the N W of the narrow Isthmus of Corinth separating the Gulfs of Corinth and Argina. The new Corinth c 3 m from the old city was partially destroyed by an earthquake in 19 8. It has not been of importance since the opening of the Corinth Ship Canal in 1893. There are exports of currants olive oil and silk. Pop c 10 000. Old Corinth became famous as a trading and transport centre in the 6th cent. B.C. flourishing under the tyrants Cypselus and Periander. It sided with Sparta in the Peloponnesian War. At the Congress of Corinth (336 B.C.) Philip II of Macedon was elected leader of the Greeks. In 243 Corinth joined the Achaean League (qv) in 196 the Roman general Flaminius declared the independence of Greece (at the Isthmian Games). The city was destroyed by the Romans in 146 but colonised by Julius Caesar 100 years later. It later became the capital of the Roman province of Achaia (*see* ACHÆ). The city was famous for its luxury and vice the temple or the citadel (Acro-Corinth)

being notorious. A small Christian community existed at Corinth in the time of St Paul. Excavations by the American School since 1896 have laid bare valuable archaeological remains including the ancient market place the celebrated fountain of Pirene large public baths and the Doric Temple of Apollo.

Corinthian Order (architecture) the most elaborate of the three Greek orders (qv) and consequently most in favour with the Romans. It was hardly used in the classical period of Greek architecture one solitary column appearing inside the Temple of Apollo at Bassae in Arcadia. The finest Greek example is the choragic monument of Lysicrates at Athens. Roman examples include the Temple of Mars Ultor (42 B.C.) Temple of Vespasian (A.D. 94) third range of Colosseum (A.D. 70) and the Pantheon (A.D. 13). *See also* ARCHITECTURE.

Corinthians, Epistles to two books of the New Testament being letters written by St Paul to the Christian Church at Corinth. The authenticity of the First Epistle is well established but that of the Second is doubtful. The First Epistle deals with moral questions certain matters of worship and the doctrine of the Resurrection. The Second Epistle is largely a vindication of the writer's authority before the Christianised Jews who questioned it. On doctrinal matters it is important in regard to difficulties associated with the concept of the Trinity. Its main interest is in its expression of the personal religion of Paul.

Cornelius, Gaius Marcus, Roman legendary patrician who having conquered Corioli capital of the Volscians 493 B.C. was exiled from Rome following a dispute with the tribunes 49. He took refuge with the Volscians and, at the head of their army advanced on Rome. But his wife and his mother prevailed on him to withdraw. He either died in exile or was executed by the Volscians. A play of Shakespeare is based on his life.

Cork, (1) S county of Munster, Irish Free State, bounded N by Limerick,



Blarney Castle, Co Cork

W by Kerry, E by Waterford, and S by the Atlantic Ocean. The coastline is extremely indented, and contains a number of bays, of which Cork harbour is the most important, and headlands, of which Sheep Head, Mizen Head, and Old Head may be mentioned. There are several islands to the S W, among them Cape Clear Island, the most S point of the country. The surface consists of a plain in the S and E, and parallel hills in the centre and N, with rivers flowing W to E, the main rivers are the Lee, Bandon, Blackwater, and Sheep. In the N and W, the country is rugged and picturesque, in the centre and E fertile, and is well-wooded in places. The climate is warm on the whole, and the rainfall considerable.

Dairy farming is of the first importance, and considerable crops of oats, potatoes, and roots are cultivated. Fishing is important, especially for mackerel, and several rivers produce salmon and trout. Leather is the chief industry, and brewing, distilling, and the manufacture of rough cloth are carried on. Towns of note are Cork (capital), Cobh, Youghal, Fermoy, and Mallow. Area, 2800 sq m, pop 366,000.

(2) Irish port, capital of co Cork situated on the S E coast, on the R Lee. The harbour is of considerable

importance, and there is a brisk trade, in agricultural commodities and fish, with Wales and Bristol. Local industries are brewing, iron-founding, leather, and some textiles. Public buildings include the Catholic and Protestant cathedrals, the University College, and the Library. Blackrock Castle and Fort William are notable. The entry to the harbour is strongly fortified. Pop 79,000.

Cork, the bark of a species of oak tree, a native of S Europe and N Africa. The tree rarely exceeds 40 ft in height, and has egg-shaped evergreen leaves, and flowers produced in April and May. The acorns, which ripen about Oct., are edible, with a pleasant sweet taste resembling chestnuts. The bark is first stripped of when the tree is about 20 years old, and the process is repeated about every 4 years. The best cork is produced when the tree is about 40 years old, though it is productive for 150 years or more. The cork is stripped by making transverse and longitudinal incisions in the bark and cutting away each piece. It is dried for several days and then immersed in boiling water for 1 hour to dissolve tannin and other substances and to increase the bulk and elasticity of the material. The slabs are then scraped and cut.

Cormorant, a large sea-bird resembling the gannet and pelican in having the four toes of the feet webbed, but differing in its slender hooked bill and uniformly glossy bronze-black plumage, although the breast in immature specimens is white. It is an expert swimmer, and feeds on fishes, up to the size of mackerel and herring, which it catches below water and brings to the



Cormorant

surface to swallow. Its nest of seaweed is usually built on precipitous cliffs sometimes in trees. Not infrequently it feeds inland in lakes and rivers. Related species closely resembling it are found all over the world. In England cormorant were formerly tamed like hawks and used for catching fish and the custom is still practised in China.

Corn (1) General name for cereal crops or the grain they yield. Originally the term was applied to any small hard particle and hence became transferred to hard seeds. In England the name includes all cereals or can be applied to wheat only. In Scotland it usually means oats and in the United States maize or Indian corn. In Britain maize is sometimes called corn-on-the-cob. The term corn is best restricted to cereal crops. The expression corn in Egypt probably referred to wheat or barley. The name cornel beef comes from the original mode of preservation by salt in grains or corns.

(2) Thickening of the epidermis or outer layer of skin caused by pressure or friction and soon becoming itself a source of irritation by pressing on the deeper more sensitive layer. Corn may be hard or soft the former generally occurring on the upper surface of the toes the latter between the toes. Tight or badly fitting boots or shoes are the usual cause of corns and the wearing of them must be discontinued. The corn should be pared down after softening in hot water and strong acetic acid or nitrate of silver applied every night. Various corn plaster are obtainable to which the skin adheres. Soft corns should be cut with scissors and acetic acid applied.

Corn-crake (or *land-crake*) a brown bird akin to the rails and moorhens. It is about the size of a partridge and spends much of its time on the ground hunting for insects on which it feeds. Its build is adapted for running. It nests in high grass or corn and at night fall utters a harsh call. It is found throughout Europe and as far E. as the Yenisei, and is a summer visitor

to Britain and also sometimes to N. America and Greenland. In winter it visits Africa.

Corneille [*pron* KOR-nyel] Pierre (1606-1684) French dramatist, as born at Rouen. His first play *Médée* appeared in 1639. Several comedies followed among them *La Tante* (1633) and *La Place Royale* (1634). In 1635 *Médée* appeared in 1636 *Le Cid*. This was an immediate success and remains one of the finest plays in the French language. Many controversies arose over the tragedy. Richelieu and the Academy attacked it claiming that in it all the rules of French drama were broken but it remained as popular as ever. It was based on a Spanish tragedy by Guillen de Castro.

Other plays followed *Polyeucte* (1640) *Le Menteur* and *Le Moli de Pompée* (1643) and *Horace* (1647) among them. In 1647 Corneille became a member of the Academy but his later works showed a great falling off in strength. Corneille is regarded as the father of French tragedy; he showed that submission to the rules and the unities was not the only virtue of the dramatist. His brilliant characterisation and his eloquent expression of noble thoughts had for centuries an undying influence on playwrights of all countries.

Cornelia, daughter of Publius Scipio Africanus and wife of Sempronius Gracchus, widow whom he married 183 B.C. Renowned for her pride in her sons Tiberius and Caius Gracchus the reformers. A statue was erected to her memory inscribed *Cornelia Mother of the Gracchi*.

Cornelian, see **CARNELIAN**.

Cornelius Nepos fl. 1st cent. B.C. Roman historian is accepted as the author of the *Historia Universalis* under some and of lives of Atticus and Cato the Censor under others. Knowledge of these historians is general.

Cornelius, Peter von (1833-1897) German painter born at Posen. After decorating a church here at Posen and making designs for *Forest* he moved in 1861 to Bonn where he

joined a group of young German painters. He returned later to his own country to remodel the Düsseldorf Academy, and to supervise the decoration of the Glyptothek at Munich, where in 1825 he became director of the Academy. He painted the important frescoes of the Ludwigskirche, and in 1839 went to Berlin to decorate the royal mausoleum with Apocalyptic scenes for Frederick William IV. He visited England in 1841 in connection with work on the Houses of Parliament. Cornelius founded a German school of painting and revived the art of mural decoration.

Cornell University, American University at Ithaca, in New York State, was founded in the latter part of the 19th cent., mainly through the benefactions of Ezra Cornell. It is co-educational, and has c. 5500 students.

Corner, see STOCK EXCHANGE

Cornflower, a favourite garden flower (*Centaurea cyanus*) of family Compositæ. The flowers are double and obtainable in blue, white, rose, and carmine. They are most effective as cut flowers or for border cultivation, producing multitudes of flowers for little cost and trouble. They are hardy annuals, and may be sown in the open border in April or May.

Cornice, a carved moulding round the top of a building. The term is applied also to the moulding, often of plaster, round the top of a wall, just below the ceiling.

Cornish Language. This Celtic language was spoken in Cornwall as late as the 19th cent., but now survives mainly in certain place-names. For its relation to other Celtic languages and to the main Indo-European family, see CELTIC LANGUAGES, and TABLE INDO-EUROPEAN LANGUAGES.

Corn Laws, various enactments designed to ensure an adequate supply of cereal foods to a country, usually by protection allotted to its own farmers. In England from the 11th to the 15th cents. all export of grain was forbidden save with special permission in times of glut. This attempted protec-

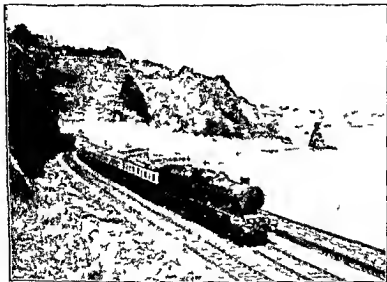
tion, concerned with rigid control of internal trading, succeeded only in making agriculture inefficient and in diminishing supplies. In 1436, export was therefore allowed when the price fell below a certain level. This was supplemented in 1463 by the prohibition of import, except above the price at which export was forbidden. But as the policy of all countries was to forbid export, this enactment proved a dead letter. In Elizabethan times corn prices rose steadily to a level which caused much distress, and they were raised by Parliament in 1604 and 1624.

In 1660 heavy duties were imposed both on import and export, but in the following years the emphasis steadily shifted to the prevention of import and the protection of home farmers. Thirty years later a desperate change of policy with the object of stimulating agriculture, resulted in a bounty on wheat export (1689). Unexpectedly, owing to the improvement of the currency by Sir Isaac Newton, grain prices fell heavily, and still heavier duties on import were exacted. Burke's Act of 1773, however, prohibited export at the price of 44s a quarter, and allowed import at a nominal tariff at prices above 48s. A steady import trade grew up, varying in size inversely with the home harvest, yet tending steadily to increase with the growing home population. At the same time wheat production at home improved both in efficiency and amount. A satisfactory position seemed to have been reached. During the French Revolution, however, the farmers obtained an increase in the minimum cheap import price from 48s to 54s. The result, influenced by the War and the deficiency of home and foreign harvests, was to cause such a falling off in supply that in the last years of the century the Government were forced to grant a bounty on imports. Corn prices rose from an average of 40s a quarter from 1770 to 1790 to 120s in 1801. In 1814 an Act was passed allowing free import above 80s, at which level the price became stable for a short period. A fall

naturally set in with a return to normal conditions and the following 9 years were occupied with abortive attempts to maintain the high level. In 1839 Sir Robert Peel introduced a sliding scale of tariffs but the commercial and free-trade interests were now gaining the ascendancy and in 1846-69 through the activities of Cobden and the Anti-Corn Law League the duties were wholly abolished. A period of 60 years *laissez-faire* was broken in 1930 when

any inexhaustible store. In Roman mythology, Jupiter, who was nursed by a goat, broke off one of its horns and swore that it should never be empty but should produce whatever was asked of it.

Cornwall, county in the extreme SW of England containing the most S and the most W points of the country in the Lizard and Land's End respectively. In form Cornwall is a peninsula bounded N and W by the



Correspondence: R. J. E. Jones, 10 D. Welsh,

the Government guaranteed a price of 40s per quarter to the home producer which involved a subsidy of c. 20s a quarter or £5 millions a year.

Corn Salad (*Lamb's Lettuce*) a small plant of the order Valerianaceae common in cornfields. It is about 6 in high its stems end in a head of minute white flowers. It flows annually in May or June the leaves are often eaten as salad on the Continent.

Cornucopia (KOPNOCKO PИC) literally horn of plenty. It refers to

Atlantic Ocean S by the English Channel and E by Devonshire Its greatest length is c 78 m and maximum width 4 m the R. Tamar forms most of the boundary and the Scilly Islands some 25 m to the SW are part of the county The surface consists first of a mountain system immediately W of the Tamar culminating in Brown Willy (1375 ft) then across the valley of the R. Camel to a high central moorland rising to Hensbarrow Beacon followed towards the

N W by a somewhat lower moorland, to another hill system well N of the Lizard, and extending to Redruth. A broad valley separates this from the final high hills of the extreme W. On both sides of the moors deep and fertile valleys stretch towards the sea, watered by various short rivers including the Camel, Looe, Towy, and Hayle. The coast is largely rock-bound, and the magnificent cliff scenery has helped the growth of many watering places.

The climate is mild and frequently wet, and vegetation in the valleys and in the Scilly Isles is luxuriant, the vegetable produce and flowers are



Looe, Cornwall

among the earliest arrivals in the London markets. There is a good deal of pasturage, and many sheep and cattle are raised. The principal grain crop is oats, there is much market gardening.

Cornwall has long been famous for its tin-mines, which may have been known to the Phœnicians, these and the copper-mines have declined owing to the increase of cost of producing from greater depths.

Fishing is extremely important, and enormous numbers of pilchards are caught, as well as mackerel, eels, and herrings. Important towns are Bodmin, the county town, Redruth, Truro, Launceston, and Camborne. Traces of the ancient Cornish language

are still found. The county is especially rich in antiquarian interest; the stone cromlechs are among the most famous in Europe, and there are stone circles, monoliths, hut dwellings, crosses, and ancient baptisteries. Area 1357 sq m, pop (1931) 317 915.

Cornwall, Barry, see PROCTOR BARRY WALLER.

Cornwallis, Charles, 1st Marquess (1738-1805) British general. Entered the Army, 1760, and served as Major-General in the American War of Independence, being second in command of British troops from 1778, and defeating Gates, 1780, and Greene, 1781. He surrendered to Washington at Yorktown, 1781. He was appointed Governor-General of India, 1786, and defeated Tippon Sultan at Seringapatam, 1792. He was Viceroy of Ireland, 1798-1801, and negotiated the Treaty of Amiens, 1802. He succeeded Wellesley as Governor-General of India, 1805.

Cornwallis, Sir Wm. (1714-1819) British admiral, brother of Marquess Cornwallis. Served with Hood and Rodney off N America, 1780-2. Became vice-admiral, 1794. Defeated the French fleet under Joyeuse in the Channel, 1795. He became admiral, 1799, and served till 1806.

Corolla (bot.), the inner leaves or petals of a flower.

Coromandel Coast, former name of the E coast of India, particularly the narrow strip on the W shore of the Bay of Bengal.

Corona, see SUN.

Coronation, the act or ceremony of crowning the sovereign of a country. The present ceremony in England has existed with modification since the time of Edward I. It takes place in Westminster Abbey, where the Coronation Chair is kept. Beneath the seat of this chair is the Stone of Scone, brought to England from Scotland by Edward I, and said to be the stone on which Jacob laid his head when he dreamed his dream at Bethel.

The ceremony is long and complicated, being opened by a service read by

the Archbishop of Canterbury after which the oath to observe the constitution is taken. The anointing follows a ritual derived from the royal coronations of biblical times. A sword is then girded on and the orb and ring are handed to the sovereign after which he receives homage from the peers. After this his consort is crowned.

The crown sword and orb are among the Crown Jewels in the Tower of London. It is usual for the coronation to be postponed to the end of the period of mourning for the late sovereign.

Coronel, Battle of, fought on Nov. 1, 1914, between British and German naval squadrons under Rear Admiral Sir Christopher Cradock and Vice Admiral von Spee respectively. The British were defeated, losing the *Go d Hope* and the *Monmouth*. The remaining British ships escaped in the night.

Coroner, an officer whose duty it was to keep the pleas of the crown. The office was first instituted in the 12th cent. and is still very important at the present day. It is the coroner's function to hold inquests, i.e. to inquire into deaths from violence or unknown or unnatural causes and into cases of treasure trove. The coroner must be a barrister solicitor or legally qualified medical practitioner of at least 5 years standing in his profession. The appointment is made by county councils or boroughs which have Quarter Sessions of their own and are either county boroughs or have a population of 10,000 or more. See also **INQUEST**.

Coronet, a special crown worn by nobles on State occasions and represented above their coats of arms. The designs vary according to the rank of the wearer. In England the Prince of Wales's coronet is distinguished from the royal crown by having a single instead of a double arch. A duke's coronet has on the rim 8 strawberry leaves, that of a marquess 4 strawberry leaves and 4 silver balls alternatingly, that of an earl has 8 silver

balls on long spikes alternating with strawberry leaves set lower. A viscount's coronet has 10 silver balls close together and a baron's 6. See also **CROWN JEWELS**.

Corot (*pron.* KORRÖ) Jean Baptiste Camille (1796-1875) French landscape artist. He and J. F. Millet were the two greatest painters of the Barbizon school. Although he is known chiefly for his landscapes, Corot produced quite a number of figure paintings which are among his finest works. Like his earlier landscapes, they are



Corot, Woman in Landscape

very beautiful in colour and particularly in tone values, carefully drawn and executed and realistic in treatment. His later landscapes, which are his most widely popular work, are far looser in handling and more romantic and poetical in sentiment, with their soft, misty greens and lack of all definite outline. Numerous examples of his work exist in the galleries of France, England, and America.

Corporal, the lowest rank of non-commissioned officer in the British Army. He wears two stripes on his sleeve. In the Household Cavalry a sergeant is called a Corporal of Horse and a sergeant major a corporal major.

A *Lance-Corporal* is not a rank, but an appointment of a private (or equivalent) acting as corporal (*see RANK*). A lance-corporal wears one stripe on his sleeve

Corporal Punishment. In England, the infliction of corporal punishment is illegal unless done under the authority of a judicial sentence or by a person having the right to chastise the person punished. Parents, guardians, school-teachers have the right to inflict moderate corporal punishment; similarly, a master may punish his apprentice, if a minor. By statute, whipping may be ordered in certain cases by a court of law, *e.g.* incorrigible rogues, robbery with violence, if the offender is under 16, for larceny, malicious damage, etc. The whipping of women has been prohibited since 1820.

Corporation, an association of persons upon which a juristic personality, independent of its members, has been conferred by some act of the State. It is a legal person, and its distinguishing feature is that it is endowed with the capacity of perpetual succession, *i.e.* it continues to exist though its members may change. Hence we find corporations which are not associations, or *corporations aggregate*, but which consist of one person alone and his successors, or *corporations sole*. These are mainly public officials, *e.g.* the Public Trustee, the King. Corporations may also be divided into *ecclesiastical* and *lay*, the former being often corporations sole, *e.g.* bishops. Lay corporations may be either *civil* or *eleemosynary*. Eleemosynary corporations are charitable institutions, *e.g.* hospitals. The civil corporations comprise the majority of modern corporations, *e.g.* the King, municipal corporations (*qv*), etc. Corporations are created by royal consent given expressly, by charter or Act of Parliament, or implied, as in the case of ancient corporations which exist by prescription or custom, here it is presumed that the custom would not have arisen, but for the King's concurrence. Chartered corporations

may be dissolved by the death of all the members, by Act of Parliament, by forfeiture of the charter on the ground of abuse of privileges, or by surrender of the charter to the King. Special machinery is provided for the dissolution, or *winding-up*, of statutory companies.

Since the corporation has a separate personality of its own, its rights and liabilities must be distinct from those of its members. Hence a member cannot be sued on a contract made by a corporation, and the corporation is not liable for its members' torts, unless the relationship of employer and employee subsists between them. But corporations differ from natural persons in that, as such, they cannot have a guilty mind and so cannot commit crimes. The powers of a corporation are limited by the deed of incorporation. A corporation created by charter can do anything which an individual may do, unless expressly forbidden to do it by the charter, a statutory corporation, on the other hand, can lawfully do only what it is authorised to do by the Act constituting it, or by its Memorandum of Association. *See also COMPANY, JOINT STOCK*.

Corporation Profits Tax, an annual tax of 5 per cent imposed in 1920 on the profits of all limited companies, with certain exceptions, *e.g.* public utilities. The tax was abolished in 1924.

Corpus Christi, the festival in the Roman Catholic Church held on the Thursday after Trinity Sunday. It was established as a general festival in 1264 by a bull of Pope Urban IV. It commemorates the institution of the sacrament of the Lord's Supper (*qv*), and among Roman Catholics is the occasion of outdoor processions.

Correggio [*pron* KORE'DJŌ] (1494-1534), Italian painter, Antonio Allegri, who took the name of Correggio from his birthplace near Modena. His most important productions were the frescoes that he painted on the dome of the church of San Giovanni in Parma.

1591-4) which include the well known *Ascension of Christ* and particularly the frescoes on the dome of the cathedral in the same city (1524-30) illustrating *The Assumption of the Virgin*. This crowded composition shows great technical mastery. Among his best known works are the *Magdalene* in the Dresden Gallery and *The Mystic Marriage of St Catherine* in the Louvre Paris. The National Gallery London possesses several examples of his paintings.

Correspondence Schools, establishments giving instruction by means of courses sent through the post. A Correspondence School of Languages was founded by Toussaint and Langenscheidt in Berlin in 1856 and at the end of the following decade the University Extension movement in England employed the same method. In 1883 a Correspondence University was established at Ithaca N.Y. and 9 years later mail courses were introduced at the University of Chicago. At the present time over 160 American centres of higher education have followed this example. In addition there are 500 individual correspondence schools in the U.S.A. with a million and a half students. Most of the courses are devoted to technical and vocational training which is admirably outlined therein but instruction is also given in the arts and social accomplishments. One of the greatest modern exponents of the system is the University of Columbia. In England correspondence courses are largely concerned with journalism, art, shorthand and speedwriting but courses of professional education in almost every branch of knowledge are supplied in this way.

Corrèze, central department of France bounded N. by Creuse and in about the same latitude as the Gironde estuary. The surface is hilly and there are several rivers including the Dordogne. Corrèze and Vézère. In spite of this irrigation, the soil is largely infertile but agriculture (sheep- and poultry) and vine-growing are all The main

industries are flour milling rough woollens paper making and textiles. The chief towns are Tulle the capital Brive and Turenne. Area = 70 sq m. pop. 269 300.

Corrib, Lough, lake in Ireland in counties Galway and Mayo. It is 27 m. in length and 7 m. at its greatest breadth and contains c. 300 islands. The lough is shallow hardly exceeding 30 ft. at any point and is drained by the R. Corrib into Galway Bay.

Corrientes, the N.E. province of the Argentine Republic. The surface consists of great plains with a number of swamps and small lakes in the N. watered by the R. Uruguay and Panama. The climate is hot and damp and the region is places heavily forested. Cattle sheep and pigs are raised. Agriculture is still being developed main crops being maize cotton and fruits. Manufactures include sugar refining tanning and sawmilling. The capital is Corrientes a river port of considerable commercial importance. Area of province 34 300 sq m. pop. (estimated 193) 450 000. town pop. (1931) 47 000.

Corrosion, the external chemical changes which take place in materials when in ordinary use resulting in their injury or destruction. By far the most important field of corrosion problems is that of metals but the corrosion of building stone is also very important.

Iron is the most important technical metal and with regard to it the problem is a very serious one since it is unfortunately easily corroded being electro-positive (see ELECTRO-CHEMISTRY). The fundamental facts concerning the corrosion of metals are illustrated in Fig. 1. If two different metals are joined together and immersed in a liquid an electric current will flow through the liquid from one metal to the other and back through the metallic junction between the two. The two metals do not need to be chemically different but only in a different physical state. If one metal

be strained (e.g. hardened by rolling or hammering) while the other is not, the current will flow, even if one metal be simply at a higher level than the other, a current will flow so as to dissolve off the metal at the higher level and deposit it at the lower level.

During the passage of a current between two metals in a liquid, the one forming the positive electrode tends to dissolve, while the other, the negative, tends to receive a deposit of any metal present which is more easily deposited than hydrogen, and if there be no such metal, of hydrogen itself. This hydrogen, if it accumulates, will stop the flow

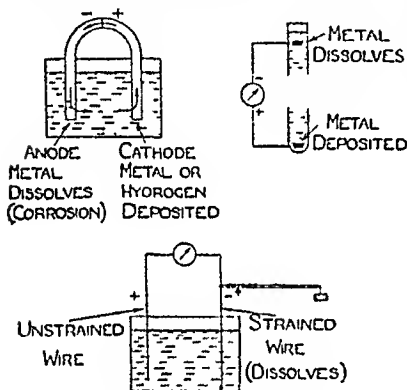


FIG 1—Corrosion

of current unless the electric force produced by the dissolving metal is very great. Normally this is not the case in corrosion, to this fact is due the possibility of making use of such a metal as iron wherever moisture is present. But the hydrogen gas film is not permanent, it dissolves slightly in water, and if there is a free supply of this, a current will continue to pass, corroding the metal from which it is coming. This may be iron itself in a different state, or an alloy of iron, and thus arises the familiar pitting of metal when exposed to wet. The hydrogen is also removed by the action of the oxygen of the air dissolved in the water, and hence iron rusts much more

rapidly when there is free access of oxygen. Hence the great care necessary to free water used in modern high-pressure boilers from oxygen, for corrosion, like all chemical action, takes place much more rapidly at high temperatures.

Referring again to the diagram, we see that the actual corrosion takes place on the part of metal where the hydrogen is not deposited, in other words, the anode. Here some compound of the metal is formed, in ordinary rusting, the hydrate and carbonate of iron. The corrosion of metals depends very greatly upon the nature of this compound formed, if it is insoluble, and forms a layer on the surface of the metal, it tends to stop the passage of the current, and so check corrosion. Aluminium is an extreme instance of this, it is converted into aluminium hydroxide, which, in a layer so thin as to be invisible, forms a perfect barrier to further action. If we prevent this barrier forming, either by continually rubbing it away or by wetting the metal with mercury, the aluminium dissolves in water with great rapidity. Iron rust, on the other hand, has no such protective quality. On the contrary, it tends to form a kind of blister which retains moisture even when outside conditions are temporarily dry. For this reason iron tools rust more rapidly when left to themselves in a damp place than when in use, the same is true of railway sidings as compared with the main line.

The prevention of corrosion depends upon the application of the above facts. As regards atmospheric corrosion, iron and steel may be protected by a coating of the magnetic or black oxide of iron, Fe_3O_4 , or the phosphate, by coating with metals such as zinc, tin, lead, and finally by various kinds of paints and enamels. The oxide and phosphate coatings are not of very much use, but their appearance is very pleasing, being blue to deep black, and if the metal can be kept lightly greased, it will not rust readily. Galvanising (g.v.) is very effective, and is

rendered still more so by painting. Tinning (see TINPLATE) affords only a slight protection since the coating is never perfect. The iron is electro-positive towards tin and hence is attacked more rapidly where it is exposed. What is called *calorising* consists in coating the metal with aluminium by a process similar to herardising (see GALVANISING).

Paint g is the common method of protection and is exceedingly effective when properly carried out. But it is obvious that if attack of the iron once begins under the paint blisters may be formed which retain moisture when conditions outside are dry and corrosion may actually be accelerated. The metal should be as clean and dry as possible and the paint should be applied in several thin coats. Particular care being taken that the priming coat thoroughly wets every part of the surface. As regards oil paint the addition of artificial driers is bad. The pigments used should be basic such as litharge, lead, white lead, zinc oxide. Small quantities of chromates are of great advantage. American vermilion (basic bromate of lead) appears to be the best of all pigments.

The corrosion of building stone in modern cities is due to the products of the combustion of coal and coal gas, chiefly sulphuric acid. The Houses of Parliament have suffered so severely that the most necessary repairs will cost something in the neighbourhood of 1 million while the chief active agent, sulphuric acid, has been detected at great depth. While certain stones and cements are practically proof against this form of corrosion many old buildings are doomed unless a change is made in the conditions by means of legislation which would involve the abolition of the open coal fire. Stone can be treated with a preservative before use but it seems practically impossible to arrest the decay of existing buildings except at prohibitive expense.

Corrosive Sublimate, the popular name for mercuric chloride HgCl_2 . It

is so called on account of its extremely poisonous nature. It is used medicinally as an antiseptic and as an astringent. See also MERCURY.

Corrupt Practices, treating bribery undue influence false declarations as to election expenses etc. at parliamentary or local government elections. The penalty is fine or imprisonment and conviction disqualifies for membership of the House of Commons or from holding public or judicial office for 7 years. Corrupt practices in connection with public bodies e.g. town councils electricity board county council etc. are also severely punished.

Corsairs, mediæval pirates whose particular base was the N Coast of Africa from which they plundered all Christian ships especially the Spanish treasure vessels from America.

Corsica (Fr *Corse*) French island and department situated in the Mediterranean Sea N of Sardinia from which it is separated by the Strait of Bonifacio c 100 m S of Genoa. Area c 2400 sq m. The coast is fairly smooth on the E but broken and deeply indented on the W to the N and S are the large gulfs of Ajaccio and Cagliari respectively. The surface is mainly high and consists of a great central ridge N to S with spurs and peaks running out on either side the mountains being composed mainly of granite and limestone. Around the coasts is a low and in places swampy plain. There are several rivers chiefly rapid or torrential of which the most important are the Golo Tavignano and Gravone. The range of climate is considerable quantities of snow fall in the mountains the intermediate region is warmer and quite healthy while the plains are hot and in places malarial. The soil is fertile and there are magnificent forests fair quantities of olives fruit vegetables and grapes are exported. Sheep and goats are reared and silkworms cultivated. Minerals include copper anthracite granite and marble. The fishing industry is valuable and game is plenty.

ful in most parts of the island. The pop is mainly of Italian stock, and Roman Catholicism is the general religion, education is fairly good, but communications are poor. The chief towns are Ajaccio, the capital and the birthplace of Napoleon, Bastia, Corte, and Calvi.

Corsica was first inhabited by a Ligurian race, who were soon dispossessed by the Phœceans. These were conquered by the Etruscans, who were followed by the Romans. The Vandals and Goths ravaged Corsica, and later it fell to Charlemagne. In later centuries the Genoese conquered it and their misrule was notorious. There were several revolutions, and finally the island was sold to France, 1768. The French were expelled by the British in 1793, but reoccupied it in 1796. In 1814 the British again occupied it for a few months, and since then it has been a French department. Pop 200,000.

Cortés, Hernando (1485-1547), the Spanish conqueror of Mexico. In 1501 he left Spain for San Domingo in the *W Indies*. Seven years later he took part in the conquest of Cuba, and in 1518 was head of an expedition into Mexico. By 1528 he had completely overthrown the Aztec dynasty. Cortés then returned to Spain, where he was given the title of Marquess, but was removed from his post as Governor of Mexico. Three years later he discovered Baja (Lower) California, and finally returned to Spain in 1540, passing the last few years of his life in retirement.

Although a successful military commander, he was not a successful governor. He treated the highly cultured Aztecs with great harshness and stripped the country of all its treasures. The most complete account of his Mexican campaigns in English is to be found in W. H. Prescott's *History of the Conquest of Mexico*.

Cortona, town in the province of Arezzo, Italy, one of the oldest European towns in existence. It is noteworthy for the ancient Etruscan walls

surrounding it, and for its mediæval castle. The 11th-cent. cathedral and number of old churches, as well as its museum, contain many treasures, including paintings and Etruscan relics. Pop (1921) town 4,000, comm 30,000.

Cortot, Alfred (b 1877), eminent Swiss pianist and conductor. He studied at the Paris Conservatoire and became chorus-master at Bayreuth. Conducted the first complete performance in Paris of Wagner's *Ring* in 1902. Known principally in Great Britain as a brilliant pianist.

Corundum is aluminium oxide found in hexagonal, barrel-shaped, or pyramidal crystals, or in cleavable masses. It varies in colour, but can be distinguished by its great hardness which is inferior only to the diamond. Corundum occurs in veins in the E. United States, Ontario, and India and in metamorphosed limestones in Burma. It is chiefly noteworthy for the number of gem-stones it produces.

The *Ruby* is red corundum, and when of a clear deep colour is the most valuable of all gems. In ancient lore it was thought that it protected the wearer. The best rubies come from Burma.

The *Sapphire* is blue corundum, and varies from very pale to deep blue, the value being proportional to the deepness of the colour. In the E it was formerly regarded as Saturn's stone and worn as a talisman. The best come from Ceylon, and both rubies and sapphires are found in the United States.

Emery is a greyish-black variety of corundum containing much iron. It may occur massive, and is often found in sands formed from the weathering of rocks containing corundum. After being crushed, ground, and sifted, it is used for polishing hard surfaces. See also **ABRASIVES**.

Corunna [COR-ŌŌN'-A] (1) province of Spain, bounded N and W by the Atlantic. The coast, sharply indented, provides several good ports, including Ferrol, Mugia, and La Coruna (Corunna). The surface is

hilly and the province watered by several small rivers has a good rain fall. Agriculture is the principal occupation. Crops include cereals, vegetables and grapes. Large herds of cattle are raised and fisheries are important. Coal and manufactured goods are imported mainly from England. The chief towns are La Coruna, Santiago de Compostela (26 000) and Ortigueira (6 000). Area 3050 sq m. pop (1931) 774 000. (?) Capital of the Spanish province of Corunna. It has a large well protected harbour on the Atlantic and is an important fishing centre. There are large exports of agricultural products and tobacco and a considerable passenger trade. The churches of Santiago and the Colegiata are interesting. The town is believed to have existed in Phœnician times. Corunna sheltered the Armada in 1588 and was sacked by Sir Francis Drake 10 years later. Battle of Corunna fought here. Pop (1931) 75 500.

Corunna, Battle of (Peninsular War) (Jan 16 1809) the British under Sir John Moore (who was slain) defeated the French under Soult.

Corvée, forced labour. The name is specially applied to the unpaid labour owed by tenants in France to their lord under the feudal system. It later came to be used for forced labour in the service of the State or on public works such as roads and canals. The system died out with serfdom in Europe except in France where it was continued under the form of a labour or money payment for the upkeep of roads.

Corybantes [KORIBAN TEZ] the Greek priests of Cybele the mother of the Gods. They celebrated her festival with wild orgies beating upon drums and cymbals.

Cos (or Sianko) island in the Agan Sea. The climate is fine and favours the production of vines, cereals, fruit and vegetables. Other products include cotton, tobacco and silk. The chief town Cos was the birthplace of Hippocrates and Apelles

and possesses a mediæval harbour while in the vicinity is a temple to Æsculapius dating from the 6th cent. B.C. Pop (1931) 21 169. The island was ceded by Turkey to Italy in 1914 as one of the Dodecanese (q.v.).

Cosenza (1) Mountainous and forested province of Calabria S Italy. Area 2566 sq m. Minerals include tin and silver. The chief products are silks, cottons, rice, wine (praised by Pliny), olive-oil and corn. Pop (1931) 545 700.

(2) Capital of the province of Cosenza S Italy between the Crati and Busento. There are an old castle, a Gothic cathedral and two academies of science. Manufactures include iron, steel and pottery. Pop (1931) 36 100.

Cosgrave, William Thomas (b 1840) Irish politician. He joined the Sinn Féin movement in 1913, took part in the Dublin rising of 1916 and was imprisoned. On his release he was elected Sinn Féin M.P. for Kilkenny in 1917 and in 1919 became a member of the first legalised Dáil Eireann. He played an active part in the settlement of the Irish question as Minister for Local Government in the new Irish Free State 1922 and became President of the Executive Council on the deaths of Presidents Griffith and Collins in the same year. Cosgrave has also held portfolios for Finance and Defence and represented Ireland at the Imperial Conference and the League of Nations Assembly. His party was defeated by De Valera (q.v.) in the General Election of 1932 when he became leader of the Opposition.



William Cosgrave

Cosmetics are means used to im-

prove the personal appearance. They may be divided into means of all kinds which improve the natural appearance of the skin, hair, and other parts of the body, and remove blemishes, and means by which such natural defects as cannot be removed are concealed.

A cosmetic substance universal among civilised peoples is *soap*, whose effect is to loosen and remove the dead skin cells, which are probably quite uninjurious to those living under healthy natural conditions, but in civilised life, if allowed to accumulate, are apt to encourage local infection of the skin. Where soap is liable to cause inflammation, it is usual to clean the skin with fat only. Fats are employed cosmetically in various forms, both as pure oil (olive oil), oil of sweet almonds, castor oil, etc., and also as emulsions of solid fats and waxes, as in cold cream. Pure oils and fats are not absorbed by the skin, but emulsions such as cold cream are absorbed to a certain extent. Not all fats and waxes are without action on the skin; cancer of the skin is common in many industries in which continual contact with crude oil takes place. It is probable, however, that the injurious effect is due, as in the case of tar, to very small "carcinogenic" impurities, the study of which is being intensively pursued.

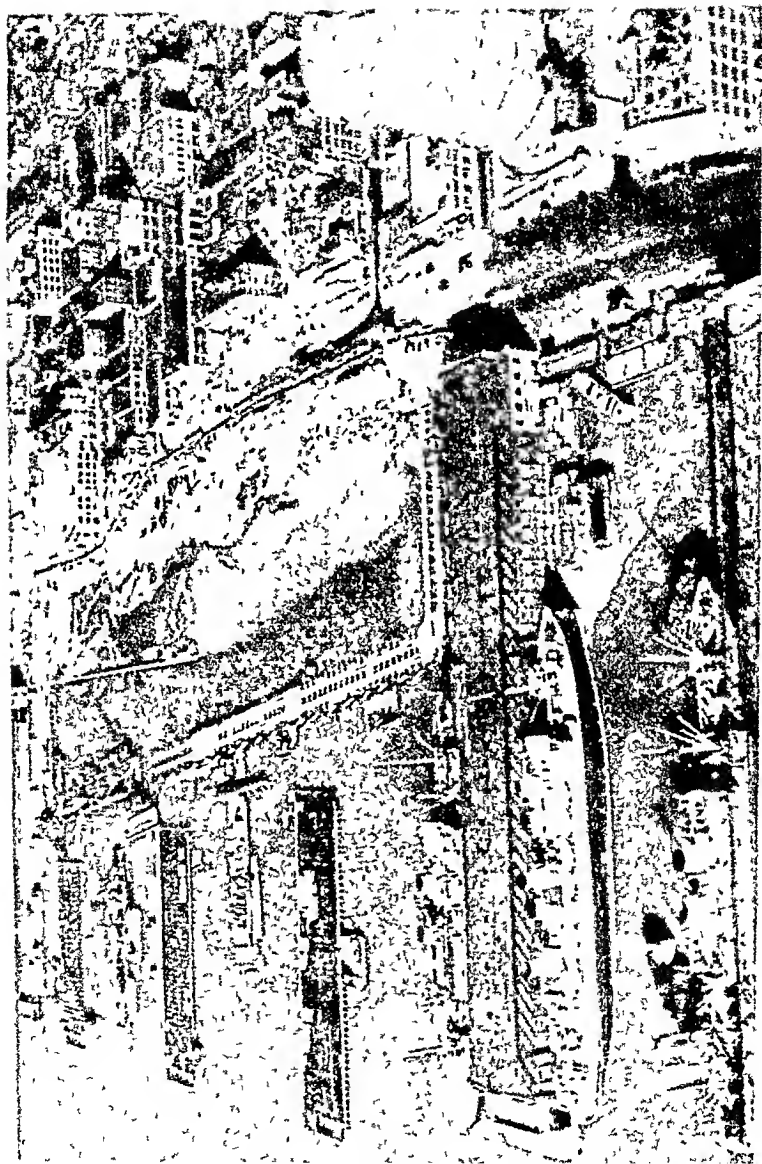
Face powders are made use of to conceal the natural skin and give it some desired tint. These generally consist of starch or talc, combined with oxide of zinc, the colour being given by carmine, eosin, ochre,umber, burnt sienna, indigo, and various other colouring matters. None of these materials has any injurious effects.

For stage purposes, and also to an increasing extent in everyday life, grease-paint is utilised. This consists of solid fat of various compositions, generally a mixture of coco butter and tallow with some wax, coloured with all kinds of pigments. This is spread upon the skin, rubbed smooth and afterwards covered with a thin layer of powder, excepting where strong

colours are used, as on the eyebrows and lips. Of late, watery liquids, containing powder and pigment in suspension, are also coming into use, even for stage purposes, the drawback being that perspiration is liable to affect them more than grease-paints.

Generally speaking, influences which lead to the blood supply of the skin being frequently stimulated are favourable to its continued tenses and tone, these are exposure to sun, varying air and water temperature, and the effect of active exercise. The increase of tone produced by artificial or natural sunshine on the skin is very striking.

It is probable that radiation of all kinds will play an increasing part in future cosmetic treatment. Apart from the rays of visible light, we have the shorter ultra-violet and the longer infra-red rays. The degree to which any type of radiation penetrates the skin depends upon its length, the ultra-violet penetrates only a fraction of a millimetre, the visible radiation varies considerably, when we look at the hand against a strong light, quite a considerable amount of red light passes through it. Infra-red penetrates still more deeply. On the other hand, these rays may act in two ways, both chemically and by the production of heat. The ultra-violet rays have a very strong chemical action, producing in the skin the substance histamine, which is a strong poison, and arouses a strong reaction on the part of the body with the object of effecting its removal by greatly increased blood-supply. This effect is only produced some 24 hours after exposure to the radiation. Heat radiation, on the other hand, also causes a flush of the skin, the object of this being to combat the rise of temperature by increased blood-supply. The effect of the sun is a combination of both, since its rays contain a very considerable proportion of ultra-violet. Ultra-violet light is an extraordinarily powerful agent in eliminating infections of the skin, and is universally used in the case of tubercle, lupus,



AERIAL VIEW OF THE NEW YORK RIVER FRONT

acne and many other infections though with many people it causes a formation of curl or even complete peeling of the skin. It does not cause a strong formation of pigment which is due more especially to blue and violet rays. When this effect of sun burn is desired for cosmetic reasons special arc lamps are necessary the ordinary mercury vapour ultra violet producing by itself only a yellowish tinge of the skin. Both λ and radium rays are far too dangerous for use except in special instances.

As cosmetics for the hair there are first of all dressings which are mainly required when the hair does not produce sufficient oil these supply the deficiency and their use may prevent the hair from being infected by micro-organisms against which the natural grease is a protection. Other dressings are mainly effective on hair which is too greasy or moist by removing the excessive grease and since they contain alcohol drying the hair.

The colour of the hair is changed by bleaching by dyes of which many are in use the safest being henna and the most dangerous paraphenylene diamine more commonly known as para. This produces a variety of shades from brown to black and the



The Wrinkles of the Face.

which is very difficult to cure. The hair is lightened in colour and finally bleached by the application of hydro-

gen peroxide which in many cases causes the hair to break off.

A further branch of the cosmetic art approaches surgery and consists in removing or lessening the shape of the nose, face and lips and the filling up or removal of the hollows in the face which accompany old age.



Method of Face-lifting.

Cosmic Radiation. In the articles ATOM CONDUCTION OF ELECTRICITY THROUGH GASES and λ RAYS the manner in which the atoms of a gas are split up into oppositely electrified particles by radiation and so caused to conduct electricity is explained. It has long been known that however carefully a gas is shielded from known sources of radiation it still exhibits a very slight degree of ionisation but that this could be reduced apparently without limit by surrounding the gas with a sufficient amount of material which of course requires to be completely devoid of radioactive matter. This ideal is difficult to attain but the water of a lake fed by snow at a high altitude fulfils the condition and we find that when a small vessel containing a self recording electroscope to indicate the degree of ionisation is lowered into the water the ionisation becomes less and less. We are obliged to conclude that there is about us a radiation possessing incredible powers of penetrating matter. The gamma rays of radium the most penetrating hitherto studied are completely stopped by a few tenths of an inch of metal whereas this cosmic radiation so-called because most of it certainly comes from the depths of space will penetrate several yards of lead our most effective

shield against all kinds of radiation

In WAVE MECHANICS it is explained that the distinction between radiation of the type of light and X-rays, formerly regarded as pure waves, and of the type of alpha and beta rays, formerly regarded as pure projection of matter, cannot be really upheld, light behaves, in many respects as if it consisted of particles in rapid motion (photons), while rapidly moving particles of matter and electrons behave as if they had the properties of waves. It is possible that in the cosmic radiation the distinction disappears entirely. If it is regarded as a kind of light, its wavelength can be estimated as being $c/10^{10}$ that of the shortest gamma rays, or $c/10,000,000$ th of that of yellow light. However, the rays undoubtedly produce tracks in a Wilson apparatus (see Atom), we can actually see and photograph the tiny streak of white cloud left by one of these bullets fired at us from outer space.

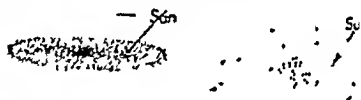
Sir James Jeans has put forward the suggestion that the cosmic rays are the result of the mutual annihilation of an electron and a proton, that is to say, of the two fundamental electrical units out of which matter is built up. Another theory whose effects can also be calculated, and which gives a result in better agreement with the observed wavelength, is that helium nuclei are being formed out in space by the combination of 4 protons and 2 electrons. Another possibility is that the radiation may be produced by the annihilation of a helium atom, or rather an alpha particle, which is a positively charged helium atom. See Sir James Jeans, *The Mysterious Universe* (1933).

Cosmology, the study of the whole material Universe as revealed by astronomy and physics—its structure, condition, and formation under the operation of natural laws.

The Galactic System The naked eye is sufficient to observe that stars are not distributed uniformly, or haphazard, but mainly congregated into a wide band called the Galaxy or

Milky Way, which seems to encircle the sky like a broad ring. Measurements show that the scale of the Galactic System is enormous; the distances separating the isolated stars are of order of millions of millions of miles. It takes light, travelling at the rate of 186,000 m per second, nearly $4\frac{1}{2}$ years to reach us from the nearest star, Proxima Centauri. The longest diameter of the system is 250,000 light-years, and its greatest depth is 50,000 light-years.

The Galaxy is somewhat like an ellipsoidal cake, 5 times as broad as it is thick, with most of the stars clustered at the centre, and many scattered loosely around it. Our Solar System lies about a third of a diameter away from the edge, and not at the centre. Thus, the appearance of the Milky Way as a ring bounding our system is deceptive, for most of the stars are towards the centre, thinning out slowly towards the edges, and rapidly to the top and bottom (see Figs below).



(a) Edge On

(b) Full On

Galactic System

The Stars Estimates as to the number of the stars in the Galactic System vary from 30,000 millions to 100,000 millions, and an approximate value of its entire mass has been estimated by Eddington to be 270,000 million times that of our sun. It is therefore clear that our sun is a star of less than average mass. A close examination of the stars shows that they vary considerably in mass, size, brightness, and temperature, and that they have different individual velocities, it is due to their enormous distances of separation that they seem to be fixed, and that the constellations do not appear to have changed their configurations in the 3000 years of recorded history. The sun, for ex-

ample is moving through space at the rate of 12 m per second towards the constellation Hercules carrying its family of planets with it. Stellar movements show that the entire Galaxy is rotating on its vertical axis with a period of 300 million years and this is corroborated by its flattened shape. The true stars vary in temperature from 3000 C to 30 000 C and range in luminosity and colour from blue to white yellow orange and red. Their sizes vary from $\frac{1}{10}$ to 100 times that of our sun though their masses are not proportional to these values since many of the largest stars are much less dense and consist mainly of tenuous gas.

Most of the stars are found to form a class whose sizes range from 1 to 10 times that of our sun and whose luminosity and diameter decrease rapidly with small decreases in mass. They exist in all colours and are called *the n Sequence stars*. Outside of this class there are *Red Giants* with high luminosity and low density and the *White Dwarfs* with low luminosity and high density though their actual masses may be much less than those of the former. The stars are therefore not continuous in luminosity and colour for every size the giants are limited to red and the dwarfs to white though intermediate sizes exist in all colours. We shall return to this point later in our discussion of cosmological theory.

Variable Stars There is a phenomenon quite distinct from twinkling and from the mutual eclipse of components of star groups (see below) found to be exhibited by many stars and is an effect due to internal constitution. Their light appears to be emitted with periodic fluctuations as if the stars suffered regular upheavals. There are 3 main classes (a) *The Cepheid Variables* named after δ Cephei which regularly rise suddenly and die down slowly and behave as though they are furnaces being re-fuelled at given intervals of weeks at the most. (b) *The Long-period Variables* which

appear to rise and decay with terms of about a year. (c) *The Novæ* are stars which suddenly blaze up from a dull body to an exceedingly brilliant orb die down rapidly and continue faint for a long time. They have no regular period.

Star Groups A surprisingly large number of stars are found by telescope or failing that by the spectroscopic method to be really double stars called binaries. They consist of two separate stars revolving round each other in close gravitational attraction. Their proximity indicates that they have a common origin and could scarcely have met by chance. It is a strange fact that in nearly every Binary System one star is a white dwarf e.g. Sirius B and the other a Main Sequence star e.g. Sirius A. It is worthy of note that a few stars are triple e.g. α Centauri and some are quadruple or sextuple. The components of star groups are found to eclipse each other periodically when some of them are dark or low in luminosity.

Star Clusters The telescope reveals c. 100 round objects distributed fairly uniformly within the Galaxy System. Each is found to consist of a closely combined group of many thousands of stars and is called a Globular Cluster.

Star Families The stars comprising some of the constellations and asterisms (q.v.) are found to have common properties although they are far apart from each other compared with the members of groups and clusters. Thus the stars of the asterism called the Hyades have roughly the same velocities and very similar physical properties. Their mutual gravitational influence is comparatively small and they may have had a common origin and are now separating or they may have accidentally met and are now drawing closer with increasing influence.

The Nebulae Nebulae are of three classes (a) *The Planetary Nebulae* of which some hundreds are known are stars covered with a great gaseous envelope that makes them appear as

round discs, not unlike true planets, e.g. *α Centauri (b)* *The Galactic Nebula* are large expanses of thin gaseous matter, stretching across a number of stars which are observable through them. (c) *The Lateral Galactic Nebulae* are the most important, and lie far beyond our own Galactic System, which they resemble in many respects. They appear as expanses of condensing gas in which some stars can be discerned, and they are approximately of the order of our own Galaxy in size. The Galactic System is c. 250,000 light-years broad, but the nearest outer nebula, M31 in Andromeda, is nearly a million light-years from us, and the thousands of known nebulae are all about that distance apart.

These true nebulae, named "Island Universes," exhibit a variety of structures, ranging from a spherical mass of gas to an ellipsoid, and then to a flattened disc with radial arms of condensing stars; they usually show a rotatory motion and spiral effect. Our own Galaxy must be just such a nebula as the last style, for it is much flattened and rotates, and most of its gaseous matter has become condensed to stars.

Cosmological Theories. No real attempt at a scientific explanation of the structure of the Universe could be made without a knowledge of gravitation, the force which binds all bodies in space. It was therefore Newton, towards the end of the 17th cent., who was the first to set cosmological theory in the right direction. He supposed that if all matter were originally distributed uniformly throughout an infinite space, it could not gravitate towards the centre to form a single spherical mass, as would be the case if space was finite, but would form a large number of smaller masses like the stars. This speculation was very crude, for it assumed infinite space, was given no mathematical treatment, and omitted the nebulae which of course were unknown at the time.

The *Nebular Hypothesis* of Laplace at the end of the 18th cent. avoided Newton's errors. It assumed a finite,

irregular mass of gas, already having a slight rotation and emitting radiation. It can be shown mathematically that such a mass under the influence of gravitation between its parts will rotate still faster, and become spheroidal and then ellipsoidal as its poles flatten and its Equator bulges. There will come a time when the excess matter at the Equator will condense to nuclei which leave the main mass, but continue to revolve around it as independent bodies. And now Laplace fell into a great mistake—he applied his theory to the origin of the Solar System (q.v.) and not to the outer nebula—he took the sun as his moving mass, and the planets as the offspring. His hypothesis is substantially accepted for the nebulae, with their huge dimensions and gaseous material forming a system of stars like our Galaxy, but will not hold for the birth of planets from a star with its high semi-liquid density, and the high relative mass of planetary primary.

The contemporary theories of Jeans afford reasonable explanations of the origin of nebulae and the Solar System; they are treated rigidly by mathematics, and are remarkably well supported by astronomical observation. He begins with an enormous space in which matter is distributed uniformly as a fine, tenuous gas, and supposes that at some time in the remote past a wave-like disturbance was set up in it to break its tranquillity. He then proves that this will result in the formation of a number of conglomerations of matter, each rotating and developing a high temperature, and of just those dimensions and distances of separation as we find in the nebulae we know. And the historical development of a nebula will be from sphere to ellipsoid, and then to spiral rotating disc, with smaller condensations from its Equator forming the stars—and the calculated masses of such stars agree well with observation.

Now what should be the next developments in the stars themselves? Mathematical analysis shows that a

rotating semi liquid body of the size of a star will after reaching the ellipsoid stage begin to form a waist and finally divide into two bodies not necessarily of the same size. These will then continue to revolve round each other as a stable Binary System. This is well in accord with experience which shows that double stars are very frequent.

On the basis of the time required for fission of a single mass into two bodies we can obtain a rough estimate of the time the stars in our Galaxy have been in being giving millions of millions of years. But the stars are continuously emitting radiation in light and heat at an enormous rate—whence comes this tremendous output of energy? The old theory of stellar contraction will not hold because the stars would by now have become absurdly small and in addition a star a store of radioactive material would be hopelessly insufficient. The way out is indicated by Einsteinian Relativity (qv) which shows that matter and energy are inter-convertible. We must therefore suppose that with the tremendous pressures and temperatures existent in a star its own material is being changed into energy of radiation. On this idea the Red Giants are at their beginning of life changes and the White Dwarfs at the end for though they may have been born about the same time the former started with much greater masses.

The explanation of the genesis of a planetary system to a star as with our sun is given by Jeans's Tidal Theory (see SOLAR SYSTEM) and is shown to be due to a rare accident and not to general development. Again the production of a Satellite System to a planet as with our earth is also a special occurrence and has received attention by Darwin and others (see EARTH).

Finally it must be borne in mind that our modern theories are by no means the last word. There is much they leave unexplained and much that is highly speculative.

An outline of the constitution of the Universe will be found in the article ASTRONOMY (SCIENCE) the relationship of the earth and the other planets to their central sun is given under SOLAR SYSTEM (qv) and the nature of a typical star is described under SUN (qv).

Cosmos or **Cosmos** (bot) a half-lardy annual of the family *Compositae* with a great deal of divided lathy foliage and large single or double inflorescences (qv) the single ones having a yellow centre and disc of white or a shade of pink lavender or blue.

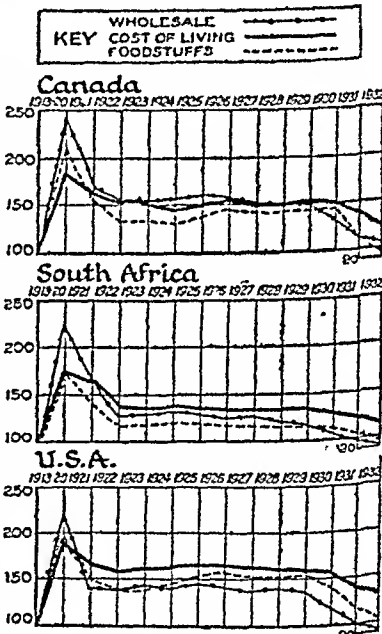
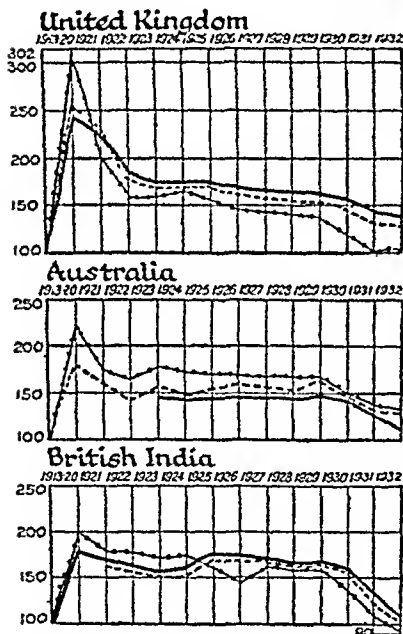
Cossacks, originally a general name for armed adventurers later applied to a certain section of the Russian people of mixed Tartar Polish and Russian origin. In the Middle Ages they formed a separate community and were employed because of their military prowess by the Polish and Russian kings. Their occupations were agriculture and cattle and horse breeding. An important branch of the Cossacks settled in the Don Basin (c. 1500) other branches formed settlements along the frontiers especially in Poland. The fighting tradition of the mounted Cossacks was maintained in the World War against the Germans and Austrians and the Turks in Transcaucasia. At the Revolution the Cossacks at first supported the White Armies but badly treated by Kerensky joined the Bolsheviks though Kaledin leader of the Don Cossacks remained sympathetic to Kornilov, Alexeev and the interventionists. Many volunteer units however continued to fight against the new regime and the struggle continued in the Ukraine until the death of Kolchak in 1919. After the Revolution 30,000 Cossacks left Russia. The Don Territory was declared an autonomous Cossack Republic in 1918.

Cost-accounting a special branch of accounting designed to show the cost of individual articles and services since ordinary accounting or book

keeping (*q.v.*) provides only unanalysed total results. By ascertaining the proportion and aggregate of labour, material, and overhead costs, indications can be obtained for price and profit-fixing.

Cost of Living, the comparative cost at various times of a certain standard list of items which constitute the normal minimum needs of a worker. Comparison over

of living for an English coal-miner with that for an Indian coolie. Within limits fairly reliable comparisons are possible. Many different formulae have been prescribed, some suggesting the cost of bare subsistence, others including a complete dietary, together with rent and clothing. The official food index for Great Britain is based on the cost of proportionate quantities of beef, mutton, bacon, flour, bread,



long periods and between different countries is difficult, since minimum needs vary with habits and the standard of living customary. Moreover, unless changes and differences in wages are taken into account, cost-of-living figures alone may give a very false impression. It is therefore almost impossible to compare, for example, the cost of living in England in 1500 with that in 1930, or the cost

tea, sugar, milk, butter, cheese, margarine, eggs, and potatoes. The cost-of-living standard budget was obtained by means of an enquiry in 1904, and, beside the above food expenditure, includes also that on rent, clothing, fuel, and light, and a small margin for miscellaneous items. The pre-War weekly figures for an average family were as follows and the proportion between items

has been maintained in calculating changes

Food	£ 2 8
Rent	2 0
Clothing	4 8
Fuel & Light	3 0
Sundries	1 8
Total	£ 17 8

This sum forms the basic figure for 1914 and is represented by 100. The cost of a similar budget in subsequent years is related to the basic figure in the following index numbers for post-war years

	1914=100		
1919	918	1926	179
1920	219	1927	167
1921	35	1928	160
1922	182	1929	164
1923	174	1930	168
1924	176	1931	147
1925	176	1932	143

These figures should be read in conjunction with money wages (*see WAGES*) since adjustment between the two will give real wages which will be seen to have risen fairly steadily. Changes in the value of currency are the principal causes of fluctuation and the effect of monetary inflation (noticeable in the English figures of 1919-'20) and of deflation (19 1-2) is still more marked in the statistics of Germany, France and Italy where the movement was much more pronounced. In America researches have been made to obtain data for cost-of-living indices for families with different incomes since the amounts of constituent items will vary considerably and the effect of price changes will be different for different incomes. Higher income tends to mean a reduction in the percentage allotted to food, rent and fuel and an increase in that for clothing, furniture and miscellaneous articles. A rise in food prices will therefore bear more heavily on poor families than on rich, while a rise in clothing prices will affect the rich family more directly. All these factors must be taken into account in making any detailed analysis. Generally

index figures are of two kinds only—for food alone and for all items.

Costa Rica, small Central American republic between Nicaragua and Panama bounded W and E by the Pacific Ocean and Caribbean Sea respectively. The E coast is low and fairly regular broken only by small shallow lagoons on the W it is considerably broken notably at the gulf of Nicoya the large Puntarenas peninsula. There are many mountains and plateaux but along the coasts and to the NW and NE are considerable plains. The highest mountain peaks are Irazu (11 200 ft) in the extreme N, Chirripo Grande (11 485 ft), Turrialba (10 910 ft) and Buena Vista (10 600 ft). Most of these mountains are volcanic and are on the chief range the Cordillera de Talamanca. Several rivers rise in this system generally flowing E or W they include the San Juan, San Carlos and Turia. The climate is cool in the mountains and very hot and moist on the plains. There are considerable forests and a rich flora. Costa Rica is noted for its excellent coffee. The state is largely agricultural and produces bananas quantities of which are exported to England, sugar, timber, cacao and hides. Rubber growing is being fostered. Gold and silver mines are declining in value. The manufacture of goods for domestic consumption is gradually growing, those established including tobacco making, milling and butter and cheese making. Main imports are machinery, metal and cotton goods and flour.

Communications are fairly good and are extending steadily. Elementary education is free and compulsory and there are several high schools and colleges at Cartago and Alajuela. Roman Catholicism is the established religion but complete toleration exists. Government is carried on by a President elected for 4 years and a Constitutional Congress of 43 deputies elected by manhood suffrage. There are 7 Secretaries of State who act as a Cabinet. For local government Costa

Rica is divided into 7 provinces. The majority of the population is of Spanish descent, and Spanish is the official language.

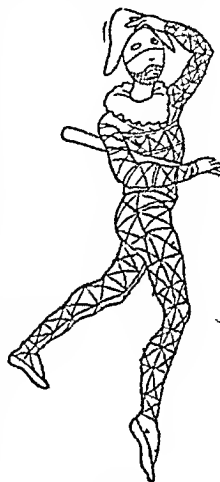
Costa Rica was discovered by Christopher Columbus, and the first European settlements were made by Spaniards, led by Columbus's brother. For 3 cents the country was regarded merely as a gold-mine and was misruled and neglected, but the Spanish rulers were ejected in 1821. The present constitution is that of 1871 (amended), since when there have been small boundary disputes and two minor revolutions successfully settled in 1919. Area, 23,000 sq m, pop (1932 estimated) 500,000.

Costs, (law) expenses incurred in litigation or other legal transactions. Costs between *solicitor and client* are the costs payable to the solicitor by the client whether he succeeds or not. The solicitor must deliver a signed bill of costs and cannot sue until a month has elapsed. The client has a right to have the reasonableness of the charges ascertained by the taxing-master. Costs between *party and party* are the costs allowed at the discretion of the court to the successful party in a civil action. In criminal or other proceedings between the Crown and the subject, the rule is that the Crown neither receives nor gives costs, but to this there are many statutory exceptions.

Costume, Theatrical Masks and symbolical costumes, features of modernist theatrical productions, are as old as the stage itself. The ancient Greeks were familiar with both devices. Masks appropriate to the type of drama performed were worn in conjunction with gowns or robes symbolically coloured to represent the character or station of the individual portrayed. In tragedy the actor wore the *chiton*, an under-robe over which a cloak was hung. To increase his height the tragic actor used the *colthurnus*, a thick-soled, stilt-like boot. Whereas the Greek costume was essentially symbolic and conventionalised, the Romans, by abandoning

masks and symbolism, imparted realism to their plays. In the early miracle plays and mysteries costumes, realistic and symbolical, were worn. Saints, angels, and devils were introduced, the parts being played, in the earliest performances, by monks who attired themselves in costumes of varying naivete. They did not hesitate to introduce buffoons and drolls in sacred pieces or to ecclesiastical vestments in their productions. In the English miracle plays of the Middle Ages performers wore coloured tunics, made of buckram, and masks, some in the form of animal heads, which completely covered the head.

Among the most notable of theatrical costumes which have been seen on the stage for centuries are those of Harlequin,



Harlequin

Columbine, and Pantaloon. These figures have been favourites with all types of audiences, including those of the Victorian pantomime in the 19th cent and the Russian Ballet in the 20th. They figured prominently in the mediæval Italian *Commedia dell'Arte*, from which the Punch and Judy show is also derived. Harlequin, about whose origin, whether French or Italian, there is some doubt, wears the tight fitting costume, decorated with diamond-shaped lozenges, which has evolved from the looser-fitting garments which were first white, then covered with irregularly shaped patches and later developed into the formal

diamond pattern. He wears a mask and always carries a wand. Colombine wears the tulle skirt of the ballet dancer and Pantaloon a costume resembling that of the jester of Tudor times.

From the time of the early mysteries and the later moralities and interludes until the foundation of the theatre proper in the reign of Queen Elizabeth special dresses in some cases of cloth

expression until the advent of the first Elizabethan theatres. Tragedies and comedies made their first appearance in the latter half of the 16th century. With pastorals and the older masques and moralities they provided an increasing field for the costume makers of the day. Shakespeare himself an actor like his fellow performers had his own stock of costumes. Some of the most elaborate dresses were still



Garrick Perod

of gold or silver tinsel etc. were worn by the actors who played the scriptural and allgorical parts which comprised the majority of the characters. The masque was a favourite pastime at the Court of Henry VIII. and costumes of some elaborateness representing various exotic nationalities, mythological allegorical and classical characters were worn. Together with moralities, a more elaborate development of the mysteries or miracles, these masques were the principal forms of dramatic

used for the masques which continued a favourite Court recreation. Contemporary accounts bear witness to Ben Jonson's lavish presentation of masques. Little is known however of the dresses worn in the original Shakespearean production, but from some drawings of Inigo Jones they appear to have been much less elaborate than those designed for royal entertainment. One characteristic of dramatic presentations during all these periods was the desire to represent

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Harlequin

tions in theatrical costume the improvement in the beauty and artistic merit of the dresses in modern production has been marked. The brilliant costumes designed by such artists as Benois and Bakst for the Russian Ballet made a great impression in W. Europe before the World War and the tradition established in those days has persisted in the later ballets by such famous artists as Derain, Picasso, Braque, Marie Laurencin and others. Balieff's Chauve-Souris Company a

ssisted by Oliver Messel a dress designer who has carried out some very effective schemes with white as a predominant colour. Charles Ricketts designs for Sybil Thorndike's productions of *Henry VIII* at the Empire (1905) and *Macbeth* at the Princes (1906) are noteworthy. Ida Rubenstein in her production of *La Dame aux Camélias* at Covent Garden demonstrated that a stage conception of the dresses and decoration of the mid 19th cent. could be one of great



Nun in *The Mistletoe*



Ellen Terry as Lady M. in *The Mistletoe*



Begg. in *The Beggar's Opera*

complete travelling theatre having actors, dress-designers, painters and musicians which has been a frequent visitor to this country in post-war years also illustrated the modern tendency in stage decoration in its many delightful and definitely non-realistic costumes and settings. An English artist the late Claud Lovat Fraser designed the dresses for the post-war revival of *The Beggar's Opera* which were exquisitely attuned to the opera's period and spirit. In A. P. Herbert's *Helen* Reinhardt was

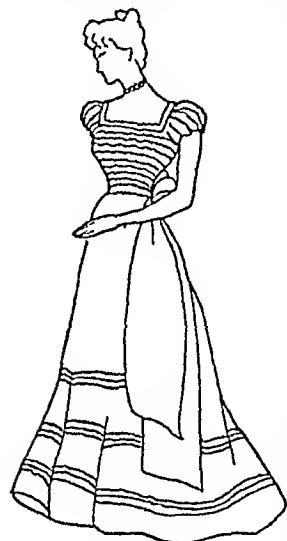
beauty. Such instances are however still the exception. Opera lags behind the stage in the matter of costume and scenery being often ludicrously antiquated.

Côte d'Ivoire, see IVORY COAST

Côte d'Or a department of E. central France having Haute Saône and Jura on the E. and S.E., Yonne and Nièvre on the W. and S.W., Aube and Haute Marne on the N. and Saône-et-Loire on the S. The department is mountainous save in the F. where there is an extensive low

classical characters in current garments. The extraordinary vogue for the perruque or wig (qv), which speedily affected first the rank and fashion of France and then the rest of Europe, spread to the theatre. Actors portraying ancient Roman characters appeared on the stage wearing wigs, while actresses wore hooped skirts on every occasion, indifferent alike to the period and the part portrayed.

The apparently original presentation in recent years of Shakespear's



Irving Period

plays "in modern dress" was a commonplace in the time of Garrick. That great actor played Hamlet and Macbeth in the velvet coat, knee breeches, wide turned-back cuffs and lace ruffles which were the conventional dress of the period.

Though the art of acting advanced in the 18th cent., the development of stage costume was for long retarded.

The 18th-cent. excesses and absurdities disappeared by the beginning of the 19th, when stage costumes began to be affected first by the classical movement initiated by David, and later by the reactionary romantic school. Attention was again given to historical detail and correctness, and materials were chosen both for their fine quality and stage effect. The productions aimed no higher than realism and

accuracy, and at their worst were neither realistic, symbolical, nor accurate, but merely shoddy and conventionally ugly. Henry Irving was a conscientious and generous producer, and though the dresses in his productions were individually of fine quality and authentic period, the stage picture made by the costumed company against the *mise en scène* left much to be desired. To-day the actor's state is less individually conspicuous, he is one factor in a complete scheme which includes the producer and the stage-designer. Though there are now no Irvings, Bernhards, or Terrys, their places have been taken by Reinhardt, Komisarjevsky, and Gordon Craig. Realism and sumptuousness in modern stage decoration and costume had their last famous advocate in Tree's productions at his theatre in the Haymarket just before the World War. Before that Gordon Craig, who had studied in Irving's theatre, disagreed with the accepted vogue of stage decoration. In his productions of Ibsen's *The Vikings* some novel ideas regarding the simplification and significance of costume in relation with and in contrast to the setting were expressed. Both colour and material in dress in modern productions are chosen with a view to expressing the character of the part, and its relation to the artistic whole. The intrinsic worth of the material used is unimportant, as has been shown by various experiments which have proved that the more costly materials will fail to "carry" over the footlights, whereas cheaper material treated by an artist can be made to convey perfectly the desired effect. Continental producers, and in particular Max Reinhardt, have made successful experiments in modern costume. Canvas, rubber, oilskin and other materials have all been used by Reinhardt with striking success, one example being the dress of the Madonna, in his productions of *The Miracle*, which was made of rubber, painted to represent sculptured stone. Apart from such experimental innova-

which can be effectively twisted for spinning which gives it its economic importance. Cotton is the white or tawny mass of fibres enveloping the seeds within the dry capsular fruit of the cotton plant a relative of the mallow and hollyhock. There are several species of economic importance small shrubs with large palmately lobed leaves and white or yellow flowers with purple blotches. The plants were originally tropical but are now largely cultivated in subtropical countries wherever the water supply is sufficient. South Sea Island cotton is largely grown along the coasts of Florida Georgia and S Carolina and has been imported into Egypt, where now vast areas are cultivated under an intensive scheme of irrigation. Cotton is also grown in India and China. See also CELLULOSE.

Cotton Charles (1630-1687) English poet was a friend of Ben Jonson John Donne and Isaac Walton who mentions him in *The Compleat Angler*. His poems include *Scarronides* a coarse travesty of Vergil (1644) and other burlesques. His great work however was his translation into English of the *Essays of Montaigne* (1685).

Cotton Sir Robert Bruce (1571-1631) collector of the Cottonian library now in the British Museum was also a numismatist and was imprisoned on a trumped up charge connected with the Overbury case 1615. A fire in 1731 partly destroyed his priceless library of MSS.

Cotton Boll Weevil beetle which in its larval stage is the most serious pest of the cotton plantations in America. the amount annually destroyed being estimated as representing 400 000 bales.

Cotton Boll Worm, larva of a Noctuid moth which destroys the cotton bolls and the fruit of other useful plants in N America and elsewhere.

Cotton-grass, a group of sedges plants of the colder parts of the N Hemisphere in which long silky hairs spring from the base of the ovary and envelop the seed. The hairs are used

to stuff pillows but cannot be spun because they do not twist as do cotton fibres.

Cotton Industry The concentration of the British cotton industry in Lancashire harks back to its earliest days. Nearness to Liverpool for the import of American raw cotton a suitable damp climate the availability of water power in the Pennine Valleys and later of coal were all contributory causes. In the early part of the 18th cent a considerable industry had grown up chiefly conducted in the home for which 1 to 2 million lb of cotton were imported yearly. Methods were slow until Kay speeded up weaving with his flying shuttle in 1733 and Hargreaves did the same for spinning in 1764 with his spinning jenny a first attempt to spin several thread at once. Arkwright produced a horse-driven spinning frame in 1768 which was combined with Hargreaves' invention in Crompton's mule (1779). In 1786 Cartwright invented his power loom and at the beginning of the 19th cent steam power was applied to the industry. The result of these inventions was a tremendous expansion and by 1811 five million spindles were in use.

In the early days the new factories were established in remote valleys with a fall of water and were manned by child labour from the workhouses. As late as 1835 13 percent of the operatives were under the age of 13.

Meanwhile the export trade in cotton manufactures grew rapidly first of all to Africa whence the ships then carried slaves to the American cotton fields and brought back raw cotton to Liverpool. Later a huge trade grew up with all parts of the world especially with the Far East which is still Lancashire's main market. Cotton manufactures came to constitute 5 per cent of all British exports reaching in 1913 a value of nearly £100 million. Meanwhile imports of raw cotton grew from 50 million lb in 1800 to 60 million in 1850 1500 million in 1900 and 600 million in 1914. Spindleage reached

land watered by the Saône. The chief ranges are the Mountains of Morvan in the S W, the Plateau of Langres in the centre, and the Châtillonnais in the N. The Seine rises in the last-named, and flows through the N of the département. Côte d'Or is one of the most important wine-producing areas in France.

The name "Côte d'Or" (the Golden Slope) has long been applied to the flanks of the Plateau of Langres, which falls to the Saône valley S of Dijon. Here the grapes of the celebrated Burgundy vintages ripen in a mellow climate. The districts in which the wine industry especially flourishes are Beaune, Dijon and Nuits. Apiculture and stock raising are of some importance, the chief crops are cereals, roots, rape-seed, and tobacco. A little coal is mined, and quarrying is of some importance. The département was formed out of the ancient province of Burgundy, and includes the historic city of Dijon, the capital of the département. Other places of considerable interest are Cîteaux, the chief Cistercian foundation from the earliest times, Châtillon, and Beaune. Montbard is the birth-place of Buffon. Area, 3391 sq m, pop (1931) 333,800.

Cotentin, *see* MANCHE.

Côtes-du-Nord, French maritime département directly S of the Channel Islands. The surface is hilly inland, and there are a number of short rivers. In spite of the poor soil of the département, agriculture is fairly successfully carried on. Industries include flour-milling, tanning, boat-building, quarrying, and saw-milling. The coastal fisheries are of some importance. Coal is imported, and agricultural produce exported. The chief towns are St Brieuc, the capital, and Dinan. Area, 2780 sq m, pop (1931) 652,800.

Cöthen, a town in Anhalt, N Germany, on the R Ziethe, 30 m S of Magdeburg. The modern part of the town has four suburbs, the old town has a castle and a number of interesting churches. Hahnemann, the found-

der of homœopathy, lived here, founding an academy for study in 1820. Iron founding, sugar, chemical products and the manufacture of machinery are the chief industries. Pop 27,000.

Cotman, John Sell (1782-1842), English painter and etcher, a native of Norwich. His landscape paintings in water-colours and in oils and his etchings of architectural subjects, which are well represented in the Tate Gallery, are of real merit, and he is acknowledged as a foremost English landscape painter. Cotman was one of the leaders of the Norwich School.

Cotonenster, a small shrub belonging to the family Rosaceæ, having entire, ovate leaves, smooth above and cottony on the under side, small, pinkish solitary flowers, and small, reddish berries. In Britain, wild only in Carnarvonshire, but grown in hedges and shrubberies in the S.

Cotopaxi, volcano in the Andes, in Ecuador, S America, c 19,000 ft above sea-level. Cotopaxi, remarkable for its beautiful snow-clad cone, is the highest active volcano in the world. Eruptions have been both frequent and destructive, that of 1764 being the most violent. Many attempts have been made to scale the cone, and this feat was first accomplished in 1872.

Cotswold Hills, English range, mainly in Gloucestershire, but extending S W, and N E into neighbouring counties. They include the source of the Thames, and many spots of great natural beauty. The total length is c 60 m. To the W are the valleys of the Severn and Avon, and to the E the Thames. A famous breed of sheep has been raised here for centuries. The range was the centre of a great wool district in the Middle Ages. The average height is 500-700 ft., the highest point is Cleve Cloud (1135 ft), near Cheltenham. Cotswold stone houses represent a characteristic phase of English architecture.

Cottian Alps, *see* ALPS.

Cotton, a valuable vegetable fibre,

industry and the comparatively small unit required tended at first to keep it in the hands of private owners and up to 1920 nearly all the capital sunk was supplied by local owners.

In 1911 a third of the firms were privately owned and a large part of the remainder were private companies. The tendency to combination was largely confined to price fixing associations such as the Fine Spinners and the Bradford Dyers.

seeds of the cotton plant. It is obtained in very large quantities in the United States. Its chief use is as an edible oil but the cheaper grades are also used for soap manufacture. See also OILS, FATS AND WAXES.

Cotton wool, term for cotton when used in an open form without being spun or woven. It is used for wadding and stuffing purposes for padding fragile objects and for insulation from extremes of temperature. Most im-

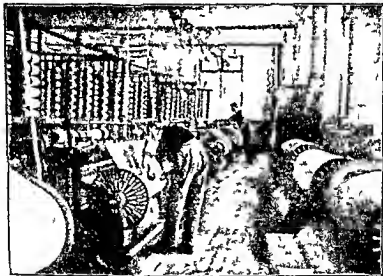


FIG. 2.—BOMBAY WORK.

During the boom of 1900 however public capital was attracted into the industry and large numbers of private firms were floated as public companies. Owing to the inflated prices at the time over-capitalisation was common and a part of the difficulties experienced by the cotton industry since then may be attributed to this cause.

Cotton spinning and weaving in 1930 employed in the United Kingdom 379,000 whom 37,000 were women.

important however is its use in medicine when it is often impregnated with antiseptic material. It is usually composed of the shorter cotton fibres which are useless for spinning purposes. The quality varies according to the purpose for which it is required, and it is sold loose or in sheets held together by gum.

Cottrell Process, 19-

TRY

Cotyledon

embryo

(?) A genus

(Crass)

expressed from the

43 million in 1900 and 58 million in 1913, looms 648,000 and 786,000 respectively

Britain's monopoly of cotton spinning and weaving was broken by the development of the American cotton industry from the seventies onwards, and our exports to the United States rapidly dropped. On the Continent spindleage also increased steadily, but chiefly for the manufacture of coarse products, which left the market for

Russia 9, Japan 8, Italy 5, world 161 Looms (thousands) U.S.A. 699, Great Britain 693, Germany 224, France 200, India 180, Russia 159, Italy 147, Czechoslovakia 125, world 3049

The cotton industry involves a large number of processes, many of which require a high degree of skill. The raw cotton is first opened, cleaned, carded into a rope, and drawn out into a kind of string. For good work it is dyed or bleached before spinning. It is then

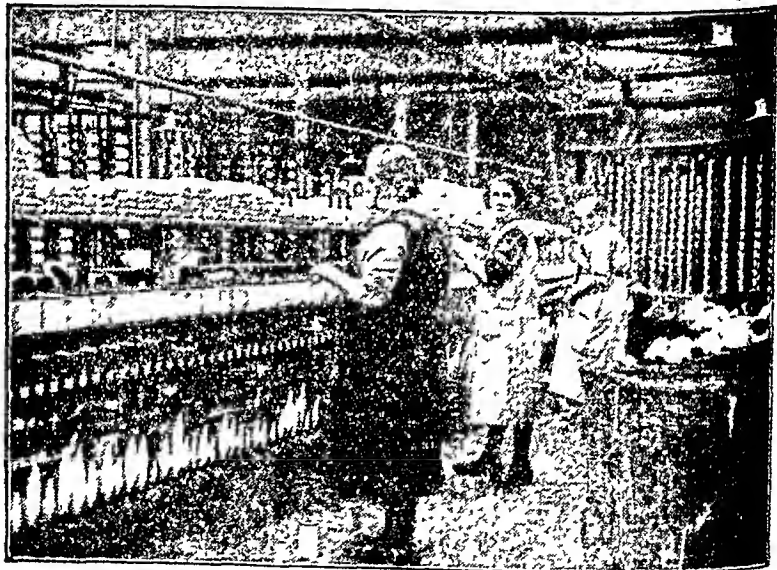


FIG. 1—Cotton weaving Winding

English fine cotton goods untouched. From 1890 spinning increased in India, and continued to threaten the Lancashire monopoly of the Indian market. Since the War the Japanese cotton industry, employing cheap labour and entering Far Eastern markets with extremely low prices, has grown rapidly. The main British markets to-day are India, China, Australia, Egypt, the Argentine, and Europe.

Spindleage (1932) was as follows (in millions): Great Britain 52, U.S.A. 32, Germany 10, France 10, India 9,

woven, a highly skilled process for which operatives specialise in particular kinds of work. Finally, the material is dyed, bleached, or printed, if this has not already been done.

The mechanical organisation of a mill must be in multiples of the first machine (a bale breaker) at every stage. This fixes an optimum size for mills and discourages piecemeal enlargements. Few changes have occurred in spinning organisation for 40 years, and practice is more or less standardised. The skilled nature of the cotton

on confirmation by the Pope. The Lambeth Conferences (q.v.) are in effect general councils of the Anglican Church.

Council, General, an assembly of bishops of the Christian world called together to settle disputed points of doctrine or discipline. According to Roman Catholic doctrine the consent of the Pope to the decisions of such Councils is necessary to the validity of their acts. The Eastern Churches recognise only the first seven and Protestants generally only the first three as general councils. The complete series is as follows:

	A.D.
1 Nicæa i	325
2 Constantinople i	381
3 Ephesus	431
4 Chalcedon	451
5 Constantinople ii	553
6 Constantinople iii	680-1
7 Nicæa ii	787
8 Constantinople iv	869-70
9 Lateran i	1123
10 Lateran ii	1139
11 Lateran iii	1179
12 Lateran iv	1215
13 Lyons i	1458
14 Lyons ii	1564
15 Vienne	1311-12
16 Constance (in part)	1414-18
17a Basle (in part)	1431
17b Ferrara Florence	1438-4
18 Lateran v	1512-17
19 Trent	1545-63
20 Vatican	1869-70

Counsel, an advocate employed by a client to plead his cause in a court of law. See also BARRISTER.

Count (Lat. *comes* Fr. *comte* It. *conte* Sp. *conde* Ger. *graf*) a title dating from Roman times, when the *comes* was a companion of the emperor and an official of great importance. Under the early kings of France the *comes palatii* or attendant of the palace was the second highest State official. The title was conferred on independent hereditary princes, e.g. the Counts Palatine. It fell in status and was adopted as a courtesy title in Germany, Italy and France. In Spain before

the revolution the title *con de* was still limited in application and carried considerable dignity.

In the British Empire there is an order Counts of Malta who rank with baronets. The wife of an earl (usually considered the British equivalent of a count) is known as a Countess. Counterfeit, see COINING.

Counter-irritants, remedies applied to the body externally which relieve discomfort elsewhere by producing local irritation. They effect relief by reflex action due to the sensation they impart to the nerves of the skin below.

According to their effect on the skin they are classified into *subfascients* which cause heat and redness—hot water being an example *caustics* like cantharides which cause blisters and the even more drastic *pustulants* such as croton oil. The stronger counter-irritants should be applied with caution.

Counterpoint (music) was at first the result of attempts to add accompanying parts to the early ecclesiastical plainsong. The term derives from the points which were used in the early days of notation. Counterpoint consisted of the addition of a line or lines of points to the original part or *cantus firmus*, each line representing a separate melody. The notes of each part were so arranged that when all the lines or parts were sounded at the same time the resulting music was harmonically correct. Double counterpoint is the name given to the process of combining parts so that either may be placed above or below the other. In triple, quadruple and multiple counterpoint the parts are arranged to allow any one of them to form a bass to the others. The greatest master of counterpoint was Bach who performed some contrapuntal feats that border on the miraculous. Palestrina di Lasso Byrd and Tallis are other composers whose works display a complete command of counterpoint. A famous treatise on the subject was written by Cicerubini.

Countess of Huntingdon & Connexion, an English Christian sect which seceded

cotyle, a dish, from the shape of its leaves. The English species is known as pennywort, a remarkable succulent plant with circular, notched leaves which are depressed above and attached to their stalks at their centres (peltate). The flowers are pendulous, and grow in racemes, 6-12 in high, of a greenish-yellow colour.

Couch, Sir Arthur Thomas Quiller-, see **QUILLER-COUCH**

Couch-grass, noxious weed whose spiked flowers somewhat resemble an ear of wheat in structure. It is a perennial grass and the rhizome spreads rapidly in all directions in light soil, sending up leafy stems from the nodes, to compete with the crop plant for light, air, and food. It should be exterminated carefully and completely as soon as its appearance is noted. See also **AGROSTIS**.

Coué, Emile (1857-1926), French psychotherapist. A study of hypnosis led him to the belief that auto-suggestion was able to effect cures in all cases. In 1910 he opened a clinic at Nancy to put his theories to the test, and delivered lectures in both England and the United States. By his famous formula "Every day in every way I am getting better and better," even organic diseases were supposed to improve. His theories received little support from the less credulous sections of the community.

Cougar, see **PUMA**

Cough, a violent expulsion of air from the respiratory passages, due to reflex action resulting from the presence of a foreign body or from inflammation. In coughing, a deep breath is taken and the glottis closed. The expiration suddenly bursts open the glottis with sufficient force to sweep the foreign particles out through the mouth. The action is involuntary, and may be caused by nervous or gastric disturbances. The nature of the cough often varies with the cause, as in whooping cough and nervous coughs. Continued coughing may lead to straining, and may have to be checked. This is accomplished by helping to

expel the irritating substance and by decreasing the sensitiveness of the nerves causing the cough. For the former purpose *ipecaacuana*, and for the latter bromides, are used.

Coulomb, see **ELECTRICITY**

Coulomb, Charles Augustin de (1736-1806), French physicist, a military engineer and, later, an inspector of public education, chiefly remembered for his invention of the torsion balance and researches into electricity. He was the first to publish the inverse square law in relation to electrical repulsions and attractions, and to discover that an electric force is proportional to the surface density of the conductor and that the medium intervening in the case of electrical action at a distance is unimportant.

Coumarone, a liquid organic compound of boiling-point 170° C., found in coal-tar. It belongs to the class of compounds known as benzo-furfuranes. It has become of considerable industrial importance of recent years as a source of *coumarone resin*, obtained by the polymerisation of coumarone with strong acids, sulphuric acid being usually employed for this purpose. The resin is widely employed in the manufacture of varnishes.

Council Bluffs, a city of Iowa, U.S.A., near the Missouri R. It is an important railway centre. Council Bluffs is connected with Omaha by bridges across the Missouri. It possesses grain elevators, extensive greenhouses, and factories. The chief manufactures are agricultural implements and wire-fencing. Pop 42,048.

Council, in the religious sense, a meeting of bishops and other ecclesiastics to discuss and decide disputed points of doctrine or discipline. It may be (i) Ecumenical or General (see **COUNCIL, GENERAL**), (ii) National, including all the bishops of a single country, (iii) Provincial, comprising the metropolitan and suffragan bishops of a single ecclesiastical province. According to Roman Catholic discipline, the acts of a Council become valid only

Zemgale and W by the Baltic Sea. The chief river is the Windau the chief port Liepaja and the largest towns are Ventispils (Windau) Kuldiga and Talsi. It is chiefly inhabited by Letts. In the 13th cent Courland came under the rule of the Teutonic knights in the 16th cent it was under Polish suzerainty in 1795 it became Russian in 1918 most of it was merged in Latvia. Area 10 450 sq m.

Coursing the pursuit of game by dogs running by sight not by scent. Modern coursing is chiefly confined to the pursuit of live hares by greyhounds the object being not so much to capture the hare as to test the rival merits of the hounds. The earliest coursing club was formed at Swaffham Norfolk in 1766. The *National Coursing Club* whose rules now govern all meetings was founded in 1838. The *Greyhound Stud-book* was opened in 1882.

The coursing season lasts from Sept to March and the principal event is the *Waterloo Cup* meeting held annually in Feb at Altcar near Liverpool. The first meeting was held in 1836. The dogs are matched in pairs the winner of one heat being matched with the winner of the next and so on to the final. When a hare has been sighted a pair of dogs are loosed simultaneously by the *slipper*. A mounted judge follows the course and decides the runner allotting points for speed for a successful *go-by* when one dog starting a clear length behind overtakes his rival on the straight and gains a clear length on him and on the skill shown by the dogs at the *turn* when the hare doubles at an angle of more than 90° at the *wrench* when the double is made at an angle of less than 90° at the *kill* and the *trip* or unsuccessful attempt at a kill.

Pack *l-coursing* with whippets is a popular sport especially in mining districts.

Court (Lat *curia* Fr *cour*)

(1) The suite of the sovereign or the place where the sovereign sojourns with his suite.

() The place where the sovereign

administers justice through his judges. It is often said that the king is the fountain of justice but this is not the case. In England in Anglo-Saxon and early feudal times justice did not issue from a central authority but was purely a local matter based on local customs and administered by local customary courts for example the *Shire Moot* the *Court Baron* etc. The Norman kings however determined to be masters in the land intent upon centralisation of the administration succeeded gradually in imposing a judicial system upon the country. They developed the doctrine of the king's Peace under which any crime is an offence against the King they appointed sheriffs and established county courts having jurisdiction in all matters from taxation to crime and supported by the full royal power. At the head was the *Curia Regis* or King's Court where the king sat in person and the original function of which was to hear appeals from the local courts of the hundred and shire and so try cases in which the king's interests were involved e.g. crimes and disputes between the king's tenants in chief. Royal justice was cheap and efficient and its influence grew rapidly. In 1178 a permanent staff of 6 was appointed the beginning of the king's Bench.

By *Magna Carta* it is directed that a court is to be held in some certain place to hear pleas between subject and subject thus we get the Court of Common Pleas or the Common Bench. Meanwhile the Exchequer which was also made a branch of the king's Council had taken upon itself certain judicial functions arising out of the collection of revenue. By the end of the 13th cent the three great Common Law Courts as they existed until 1875 were fully established though in course of time each enlarged its original jurisdiction. When these courts had become firmly settled there still remained a residuary power of justice in the Crown. Those who were dissatisfied with a decision of one

from the Church of England c 1760-70 under Selina, Countess of Huntingdon (1707-1791), who had been much influenced by Wesley and later by Whitefield (*qqv*). Some 40 chapels of the body still exist, including a well-known one at Spa Fields, London, there is a college at Cambridge for the training of ministers.

Count-out. In parliamentary procedure, when 40 members are not present at a debate or on a committee of the whole House, the speaker or chairman, if satisfied of that fact, orders all strangers to withdraw and members to be summoned from other parts of the House. After two minutes, the members are counted twice, and if fewer than 40 are present at the second count, the House adjourns.

Country Dance, see FOLK DANCE

County Council, see LOCAL GOVERNMENT

County Court, see COURT

Coup d'État [kūō dātan'], a sudden forcible assumption of power in the State by a party or person in defiance of constitutional rights, a notable example being Napoleon's overthrowing of the French Directorate in 1799.

Coupe [k'ōpā], a small four-wheeled closed carriage for 2 persons, also a motor-car with a single-compartment body containing two or three seats, or a half-compartment in a railway coach.

Couperin, François (1668-1733), noted early French composer who, as a composer for the harpsichord, revealed new possibilities in that instrument. His works were studied by Bach. Became organist to the French Court, and was known in his day as "Couperin le Grand". His compositions are of considerable historic interest.

Couplet, two rhymed lines of verse, either comprising a self-contained poem, or forming a unit in a longer poem.

Coupon, a small certificate which entitles the holder to some payment, gift, or benefit. The most common use of the word, which has a wide application, is in reference to the dividend warrants attached to a limited-period bond, which are cut off and presented

for payment, one by one. The last coupon or "talon" entitles the holder to obtain a new sheet. During the World War, the same system was applied to the administration of food-rationing, each coupon on a sheet being available for a week's ration of each commodity. About 1895 a new use of the coupon was introduced into American advertising, a detachable section entitling the sender to a descriptive pamphlet or a free sample. After the War, this form of coupon underwent two parallel developments. Instead of reducing the price of cigarettes and similar articles, the proprietors enclosed a token coupon with each packet, a certain number of which entitled the collector to certain gifts. This custom spread to such an extent—trouser-presses, wireless-sets, books, and even clothes, being dealt in—that the coupons used became a kind of secondary currency, bought and sold by dealers at fixed monetary rates. At the same time the coupon system was used in connection with newspaper competitions, one coupon cut from each copy giving the competitor the right of presenting a single solution. In 1932, this use of newspaper coupons was extended to the obtaining of sets of books at advantageous rates, and in 1933 its abolition, so far as the tobacco trades are concerned, was decreed.

Coups de Poing, see STONE AGE

Courbet [pron KOORBĀ'], Gustave (1819-1877), French painter. His early works, including the well-known *Man with a Pipe*, were rejected by the Salon, but he found his own ardent supporters, and by 1850 had broken down official opposition. His *L'Enterrement à Ornans* and his *Casseurs de Pierres* were exhibited in the Salon in that year. His vigorous and realistic figure subjects, depicting ordinary everyday events, and his fine landscapes, are well known and widely admired. He is well represented in the Tate Gallery, London.

Courland (*Kurzeme*, or *Kurland*); low-lying, forested and agricultural district of Latvia, bordered E by

of minor importance issue warrants of arrest grant bail etc. In the metropolis the Police Magistrates and in certain large towns the Stipendiary Magistrate discharge the functions of the Justices. There is a right of appeal to Quarter Sessions from a conviction allowed by sentence of imprisonment without the option of a fine provided the accused had not pleaded guilty. In questions of law any person aggrieved by a conviction order or other proceeding may apply to the Court to state a *special case* setting out the facts for consideration by the King's Bench Division of the High Court and on refusal may apply to the High Court for an order compelling the Justices to state a case. *Quarter Sessions* are held once a quarter. The Court hears appeals from Magistrates and can try all indictable offences except treason capital offences felonies (except burglary) punishable on a first conviction with penal servitude for life blasphemy perjury bigamy abduction concealment of birth etc. There is an appeal from its original decisions to the Court of Criminal Appeal on points of law law and fact fact and sentence.

Superior Courts

Civil The High Court of Justice which exercises the jurisdictions of the old courts is for the sake of convenience divided into the King's Bench Chancery and Probate Divorce and Admiralty Divisions. Every Judge can exercise all the powers of the Court and in any division. The Court administers common law and equity. The Judges consist of the Lord Chancellor who is President of the Chancery Division the Lord Chief Justice President of the King's Bench the President of the Probate Divorce and Admiralty Division and 26 *puisne* or junior Judges. Actions are tried in the Chancery Division by a Judge alone in the King's Bench and on the Probate and Divorce sides of the Probate Divorce and Admiralty Divisions by a Judge alone or with a jury on the Admiralty side of the last Division

by a Judge who sits in certain cases with nautical assessors. The High Court has both an original and an appellate jurisdiction. Its decision on an appeal from an inferior court is final unless leave to appeal is given by the Court or the Court of Appeal. No leave is required for any appeal from an original decision. The Court of Appeal has jurisdiction to hear appeals from the High Court any decision or order of a County Court judge on a question of law under the Workmen's Compensation Acts orders from a Judge in chambers on a matter of procedure etc. The Court consists of the Lord Chancellor the Lord Chief Justice the Master of the Rolls the President of the Probate Divorce and Admiralty Division every former Lord Chancellor and 5 ordinary Judges called Lord Justices of Appeal. As a rule 3 Judges constitute the Court. Appeal is to the House of Lords with out leave except in the case of certain matrimonial causes and in bankruptcy appeals. In theory every member of the House of Lords has a right to be present but by convention this right is not exercised the court being constituted by specially qualified peers known as Lords of Appeal. They are the Lord Chancellor 6 specially created Lords of Appeal in Ordinary and such peers as hold or have held high judicial office. Appeals from the Ecclesiastical Courts from the Prize Court (*q.v.*) from the highest courts of the British Dominions and Colonies from the Channel Islands and the Isle of Man so by way of petition to the *Judicial Committee of the Privy Council*. Its judgment is given in the form of reasons for humbly advising His Majesty to allow or dismiss the appeal.

Criminal Courts

The *Assizes* held under Commissions of Assize Oyer and Terminer and Gaol Delivery are courts of first instance and for all purposes branches of the High Court. They are held at certain intervals and presided over by one of the King's Bench Judges a King's Counsel or a County Court

of the courts petitioned the King in Parliament, and in this manner arose appeal to the House of Lords. Those who found the common law inadequate to meet their case petitioned the King personally, or the King in Council. Out of the latter jurisdiction grew the Star Chamber (*qv*), and ultimately the Judicial Committee of the Privy Council. Petitions to the King, however, were sent to the Chancellor who, as head of the royal chaplains, "keeper of the King's conscience" of the Great Seal, and head of the department from which all royal edicts, including writs of justice, were issued, was eminently fitted to deal with them. Partly because he was a cleric, and partly because the petitions involved points which the common law did not cover, the justice he administered was natural justice, or equity (*qv*). With the rapid increase of work involved by the issue of writs, and the administration of justice it soon became necessary to separate these functions from those of the Exchequer proper, of which the Chancellor was also the head. A separate court was formed, the Court of Chancery.

In addition to these superior courts, there existed the Ecclesiastical Courts (*qv*), with a certain jurisdiction over wills and personal property, administration of intestate estates, and matrimonial causes, which was transferred in 1857 to the newly created Probate Court and Court for Divorce and Matrimonial Causes. All these courts had civil jurisdiction, while the King's Bench, on the Crown side, had also criminal jurisdiction. In view of the hardship involved in criminal cases by the necessity of prisoner, witnesses, etc., travelling to London, Commissions were issued at an early period. These Commissions, which are still issued, are the Commissions of Assize, Oyer et Terminer (*sc* to hear and determine), and Gaol Delivery, directing the Judges to go on circuit. Such were the courts of superior and appellate jurisdictions as they existed at the time of the Judicature Acts,

1873 and 1875, which fused all these jurisdictions into one Supreme Court of Judicature, divided into a High Court and a Court of Appeal. In describing the present position, it is perhaps best to begin with the inferior courts.

Civil Jurisdiction. The ancient local courts had long ceased to exercise any jurisdiction, or, like the various Courts of Request, exercised only very limited powers, and justice had generally to be sought in the courts at Westminster. In 1816 the *Criminal Courts* were created, mainly to afford relief to poor suitors. They administer equity and common law. They have jurisdiction in all cases where the amount involved is £100 or less, or by consent of the parties if it is more, and with regard to suits for the administration of estates of deceased persons, actions respecting trusts, the redemption and foreclosure of mortgages, specific performance of contracts relating to the sale of land, up to £500. Since 1919 they have a complete jurisdiction in tort, defamation, false imprisonment, seduction, breach of promise, etc. The High Court may remit to the County Court cases where large amounts are involved, if the parties consent or the plaintiff is too poor to pay costs should he lose. Appeal is to the High Court, but if the subject-matter of the dispute is less than £20, leave to appeal must be obtained from the Judge.

Criminal Jurisdiction. Under Edward III, it was provided that in every county, good men and lawful should be assigned to keep the peace. These are the Justices of the Peace, or magistrates, with civil and criminal powers. They can make orders in bastardy cases, grant judicial separations between husband and wife, make maintenance orders against a husband in favour of his wife up to £2 per week, license places for the sale of intoxicants. Two or more justices, sitting as a court of summary jurisdiction called *Petty Sessions*, or, more commonly, the Police Court, can try cases.

13th-cent cathedral with its three towers is one of the best specimens of the early pointed style in Normandy. There is a trade in agricultural produce, cattle and horses. Lace, silks and muslins are manufactured. Pop 6400.

Coutts, Thomas (1735-1802) British banker. Born in Edinburgh, he founded the London banking house of Coutts and Co. becoming sole partner on his brother's death 1778. Acted as banker to George III. Married the actress Harriet Mellon. His fortune was left to his grandchild, the Baroness Burdett-Coutts (q.v.).

Convade *see* LITHOLOGY

Covenant, in strict law, an agreement by deed whereby one person undertakes that something has been or shall be done. Covenants are either *express* when created by the express words of the parties or *implied* when the promise is implied by law, e.g. the use of the word *demise* in a lease of land implies a covenant that the lessor has a good title to let.

Covenanters, supporters of the Solemn League and Covenant, an anti-Catholic undertaking signed by Scottish Presbyterians and English Puritans. Charles II signed the Covenant, but later repudiated it 1680. This action occasioned insurrections in Scotland and led to reprisals taken by the famous Claverhouse and Lauderdale. The determination of many covenanters to stand by their principles is still one of the most popular events of Scotch history around which is woven many legends.

Covent Garden, a locality situated between Long Acre and the Strand, London. The name is a corruption of Convent Garden, which originally belonged to the Abbey of St Peter Westminster. The square was laid out by Inigo Jones in 1632 and became a fashionable residential quarter. To-day Covent Garden is famous for its fruit, flower and vegetable markets set up in the middle of the 17th cent. Covent Garden Theatre and Royal Opera House first built in 1732 was

destroyed by fire. The present building was erected in 1858.

Coventry, industrial town in Warwickshire 30 m. E.S.E. of Birmingham. Coventry was long famous for its dyeing and woollen industries but now is chiefly concerned with engineering and the making of motor-cars and bicycles. Parts of the town are ancient and picturesque, notable buildings being the Cathedral (see created 1918), St. Mary's Hall, a 15th-cent guild centre and the Elizabethan Grammar School. Parts of the ancient fortifications and walls are still standing. The original village centred about a monastery built by Lady Godiva and her husband in the 11th cent. It became a noted wool len centre in early times. Pop (1931) 187 046.

Coverdale Miles (1488-1558) translator of the first complete English Bible (1535) was a prominent figure of the Reformation both in England and on the Continent. The Great Bible of 1539 was based on his translation and he helped with the Geneva translation of 1557-60. He was deprived of the see of Exeter on the accession of Mary and lived on the Continent until 1559.

Coverley Sir Roger de *see* SPECTATOR

Covilham Pedro de (fl c 1480-1530) Portuguese explorer. Sent by John II of Portugal in 1487 in search of the legendary empire of Prester John. He travelled to India, journeyed down the E. African coast to Sofala and reached Abyssinia but though honourably treated was never allowed to leave the country.

Covington, city in Kentucky U.S.A., on the Ohio R. opposite Cincinnati. It is partly surrounded by hills and is famous for its suspension bridge which is 2250 ft long. It has an air port. St. Mary's Cathedral boasts of one of the largest stained glass windows in the world. The chief manufactures include cigars and tobacco, iron and steel goods, X-ray apparatus and textiles. Pop 63 05.

Judge For the purpose of holding Assizes, England and Wales have been divided into 8 circuits (*qv*). For London the place of the Assize is taken by the *Central Criminal Court* (*qv*). The *King's Bench Division* has a certain criminal jurisdiction on its *Crown side*, though in practice its criminal cases are transferred to the Central Criminal Court, but misdemeanours committed by public officers are only triable in the King's Bench. Formerly there was no appeal from a conviction except on questions of law if the Judge consented to state a case, and in certain other limited cases. The *Court of Criminal Appeal* was established in 1907, with jurisdiction to hear appeals by persons convicted on indictment, criminal information, coroner's inquisitions, and by persons dealt with at Quarter Sessions as incorrigible rogues. Appeal lies on any question of law, or, by leave of the court of trial, on any ground, including appeals against the sentence, unless the sentence is one fixed by law. The Court, unlike the Court of Appeal, has no power to order a new trial, but can only allow or dismiss the appeal. If the Attorney-General certifies that a decision of the court involves a point of law of exceptional public interest, an appeal lies against the decision to the *House of Lords*. The House of Lords, in addition to this appellate jurisdiction, has the right to try impeachments (*qv*), and any peer, or peeress, against whom, during any session of Parliament, an indictment for treason or felony, or for misprision of either, has been found. See also ECCLESIASTICAL COURTS, COMMERCIAL LIST, INDUSTRIAL COURT, REFEREES, COURT OF.

Court Baron, see COURT

Courtesy Title, one which is given to its possessor by custom or favour without his having inherited it or received it by legal grant—e.g. the title of *Marquess* generally used by the eldest sons of dukes and taken from their father's second title. See also TITLES

Court Leet, see COURT

Court Martial, a court for the trial of offences against military or naval discipline, or for the administration of martial law. See also MILITARY LAW

Courtneidge, Cicely (b. 1893), English comedy actress, appeared as Peas blossom in *A Midsummer Night's Dream* at Manchester, 1901, first London appearance was in *Tom Jones* at the Apollo, 1907, played mostly in variety and revue, including *Folly to be Wise* (1931), began film-acting 1929, and has appeared in *Jack's the Boy*, *Soldiers of the King*, etc., often with her husband, Jack Hulbert (*qv*). One of the outstanding English comediennees.

Courtney, Leonard Henry, 1st Baron of Penwith (1832–1918), English politician. He was Professor of Political Economy at University College, London, 1872–5, and became Liberal M.P. 1876. Was Under-Secretary for the Home Department and later for the Colonies, 1880–81, and Financial Secretary to the Treasury, 1882. Joined the Unionists in opposing Irish Home Rule, 1886, but later favoured the measure. Raised to the peerage, 1906. Published *The Working Constitution of the United Kingdom and its Outgrowths*, 1901.

Court of Common Pleas, see COMMON PLEAS, COURT OF

Courtrai, town on the R. Lys in the province of W. Flanders, Belgium, 27 m. from Ghent. The river is spanned by a fine old bridge with Flemish towers. The town hall dates from the 16th cent. and the Church of Notre Dame from the 12th. Courtrai was the site of the "Battle of the Spurs," 1302. During the World War it was used by the Germans as a base. Pop. (1925) 37,960.

Cousin, Victor (1792–1867), French philosopher, born in Paris. He was an eclectic who appreciated almost every system of ancient and modern philosophy. His *Fragmentes Philosophiques* (1826–8) is his best work. He was made a Peer of France, 1832.

Coutances, episcopal see and capital of an arrondissement of same name in department La Manche, France. The

amples of their kind. His essays are more valuable from the literary point of view than his poems but are not so much read.

Cowley Fathers (or Mission Priests of St John the Evangelist) a brotherhood of the Church of England founded in 1865 by Richard Meux Benson (1824-1915). The Cowley Fathers taking the triple vows of Poverty, Chastity and Obedience devote themselves to missionary and educational work. Their principal house is at Cowley St John Oxford.

Cowper William (1731-1800) English poet spent his youth in desultory study of law and in wide reading. His melancholy temperament led to religious mania and he was several times removed to an asylum. In 1767 he settled down at Olney with Mrs Unwin where he wrote the charming light verse and the hymns that made him famous. The best known of his works is *The Task* (1785) a blank verse poem of epic length part descriptive part satirical and part moral. His numerous poems addressed to Mary (Mrs Unwin) who devotedly nursed him through many



William Cowper

hours of insanity, also display his genius. His works foreshadowed the romantic revival in their love of nature and freedom. His letters are charming in

their humour and friendliness.

Cowries are marine gastropod molluscs (q.v.) with oval shells in which in the adult no trace of the spiral twist is visible externally and the mouth is a long slit on the under side.

The European cowrie found on some parts of the British coast is a small dingy-coloured species with the surface of the shell finely ribbed but

many of the tropical species are as large as hens' eggs polished and beautifully coloured.



Cowries

The money cowrie is used as a kind of currency in various countries.

Cowslip or *Paigle* a common plant found in rich pastures with many yellow-green flowers in a stalked umbel drooping and funnel-shaped.



Cowslip

calyx bell-shaped leaves egg-shaped contracted below the middle. Used for making cowslip wine.

Cox, David (179... of the best kno...

Cow, term applied to female wild and domesticated cattle (*q.v.*) and extended to many other ungulate mammals, as well as to 'calions, whales, and other forms

Coward, Noel (b. 1899), English playwright, first appeared on the stage in 1910. His plays, in many of which he has himself acted, include *The Young Idea*, *The Vortex*, *Easy Virtue*, *Private Lives*, *Cavalcade*, and *Hay Fever*. He is also the author of several revues and operettas, *On with the Dance*, *This Year of Grace*, *Words and Music*, and *Bitter Sweet*. In some of these, Coward is responsible for the music as well as for the lyrics and sketches. His plays and revues are mostly satirical, and hit off the foibles and fashions of modern life, but in *Cavalcade*, a sentimental history, he scored a success that surpassed those of any of his previous productions. His play *Design for Living* made its debut in New York.

Cowberry, see **BILBERRY**

Cow-catcher, originally a frame of steel bars projecting forwards and downwards from the front of a locomotive, in order to prevent cattle and other obstructions from getting beneath the wheels of the train. Many such types of guard have been devised for road vehicles, with the object of saving the lives of persons knocked down, on tram-cars a vertical apron, contact with which releases a kind of tray, is used. Successful tests have been made with an apparatus for this purpose consisting of a roller revolved mechanically in the opposite direction to the revolution of the vehicle's wheels, it is corrugated longitudinally, and rolls a prostrate person forward instead of trapping and injuring him.

Cowdray [COW'DRAY] of Midhurst, 1st Viscount (Westman Dickinson Pearson) (1856-1927), British contractor. Entered the firm of S Pearson & Co, 1875, eventually becoming chairman. His firm carried out many important contracts, constructing the Blackwall Tunnel, the E River

Tunnel, New York, and new docks at Southampton and Dover, it later specialised in oil boring. Cowdray was Liberal M.P. for Colchester, 1875-1910, and was President of the Air Board, 1917. Created baron, 1910, and viscount, 1917.

Cowen, Sir Fredk. Hymen (b. 1852), English composer, appeared in public as a pianist at the age of 12, by which time he had already composed a light opera. He studied at Leipzig and Berlin, and became a pupil of Moschles and Richter. His cantata, *The Corsair*, was produced at the Birmingham Festival in 1876, which year saw also the first performance of his opera *Pauline*. Thereafter became widely known as composer and conductor, appearing in the latter capacity with the Hallé, Scottish, and Liverpool Philharmonic Orchestras. Composed operas, operettas, cantatas, symphonies, and many popular songs. Knighted 1911.

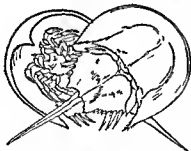
Cowes, yachting centre and holiday resort on the N coast of the Isle of Wight. The estuary of the Medina R. divides it into E and W Cowes, both of which grew up around defensive forts erected in the 16th cent. Cowes is the headquarters of the Royal Yacht Squadron. Osborne House, presented to the nation as an officers' convalescent home by King Edward VII, is in the neighbourhood. Industries are marine engineering and shipbuilding. Pop (1931) 14,774.

Cowl, a sleeveless garment with hood worn by members of certain religious orders in the Catholic Church. See also **VESTMENTS**

Cowley, Abraham (1618-1667), English poet, was one of the "metaphysical" school of poets who followed John Donne in his use of far-fetched conceits. He was a royalist, secretary to the Queen and Lord Jermyn during their exile. His *Davideis* (1656) was intended as an epic, but reached only its fourth canto, some of his odes were also highly praised, and his lyrics, published in *The Mistress* (1647), are good ex-

Cozens, John Robert (c 1751-1789) English water-colour artist son of an iron drawing master produced a number of unconventional impressionist landscapes which are said to have had some influence on Turner. Several of his pictures show scenes in Italy which he twice visited. His works can be studied in the Victoria and Albert and British Museums and here is a good example in the Tate Gallery.

Crab popular name for several kinds of Crustacea (q.v.) but properly restricted to those with four pairs of walking legs preceded by a pair modified as claws and with a short abdomen tucked beneath the cephalothorax and not used for swimming. There are a great many different species mostly found in the seas all over the world but in warmer countries a few inhabit fresh water and some live on the land paying periodical visits to the sea. The commonest on the British coasts are the edible crab, the green crab and the thornback.



King (Moluccan) Crab

which is sometimes eaten. Related to the last is the giant crab, a Japanese species, the largest known crustacean in which the span of the claws may reach c 10 ft. The hermit crab (q.v.) is a crustacean of a different group. The king crab (q.v.) is an arachnid not a true crab. Crabs are mostly carnivorous varying their diet with season. A few are vegetable feeders.

Crab-apple family *Rosaceae*. A small

spreading tree found in woods and hedges with simple egg shaped serrated leaves, flowers in a sessile umbel, styles combined below fruit hollow beneath. The branches are thornless, the white flowers delicately shaded with pink and the fruit nearly round and extremely acid. It was formerly much used in the making of verjuice and in the preparation of pomatum so-called from *pomum* an apple. Flowers in May.

Crabbe, George (1754-1832) English poet was a country doctor and later a clergyman. The experience and knowledge which he thus gained of rural characters and customs were put to good use in his verse stories of rustic life. These were published as *The Village* (1783), *The Parish Register* (1807), *The Borough* (1810) and *Tales of the Hall* (1819). He portrayed life as it was and probably influenced Wordsworth and the romantics by his pictures of Nature.

Cracking a term used in the petroleum industry for the process of heating generally under pressure heavy oils such as gas and fuel oils to temperatures higher than those used in straight run refining. The object of the cracking process is to break down the large and heavy molecules constituting these heavy oils into the smaller units which form the lighter petroleum fractions utilised as motor spirit. Cracking occurs in both liquid and vapour phases but this division is not absolutely accurate since in liquid phase cracking operations a certain amount of the process occurs in the vapour phase and *vice versa*. A more scientific distinction is by the temperature employed in the cracking processes: (a) that which operates below c 500 C and yields chiefly gasoline containing aliphatic constituents and (b) those which take place above c 550 C and yield principally aromatic gasoline.

Gasoline produced from heavier oils by cracking differs in some respects from the straight run distillate. Its properties will depend upon the type of

lish landscape school. He was born at Deritend, on the outskirts of Birmingham, where his father was a blacksmith. He spent some years in London after 1804 and again in 1835-40, after which he retired to Harborne, near Birmingham.

Cox produced an amazing volume of work. Toward the end of his life, and after his death, his water-colours sold for large sums. His handling of cloudy skies is particularly felicitous, his work shows appreciation of the principles of design, strength of drawing, freshness of technique, and straightforward sincerity of feeling, his landscapes are typically English, and he has exerted a considerable influence on English landscape art and water-colour painting.

Cox, Harold (b 1859), English journalist and politician. Graduating from Cambridge, he lectured on economics for the Cambridge University Extension Society. He studied agricultural labour conditions, and from 1885 to

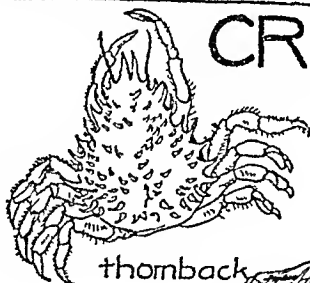
1887 was mathematics lecturer at the Mohammedan College, Aligarh, India. He then took up journalism in London, served as secretary to the Cobden Club, 1899-1904, was Liberal MP for Preston, 1906-10, and edited the *Edinburgh Review* 1912-29. He was a member of various commissions between 1915 and 1919. He wrote pamphlets on free trade currency and land nationalisation.

Cox, Sir Percy (b 1864), British administrator and general. Joined the army, 1884. Political Resident for the Persian Gulf, 1909, Secretary for the Department of India there, 1914, and Chief Political Officer for the Indian expeditionary force, 1914-18. He served as Minister to Persia, 1918-20, and as High Commissioner in Mesopotamia, 1920-3. Represented Britain at the Turko-Iraq frontier conference, 1924, and India at the Geneva Armaments Control Convention, 1925.

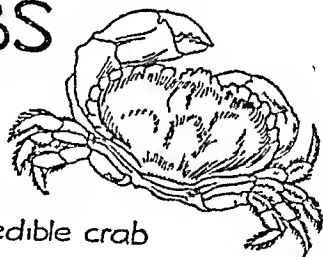
Coyote, see WOLF

Coyne, see NUTRIA

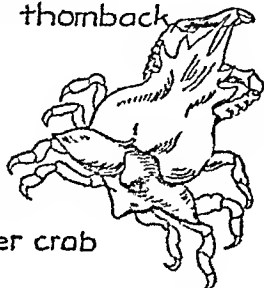
CRABS



thornback



edible crab



spider crab



shore crab

Cozens, John Robert (c 1751-1799) English water-colour artist son of an Eton drawing master produced a number of unconventional impressionist landscapes which are said to have had some influence on Turner. Several of his pictures show scenes in Italy which he twice visited. His works can be studied in the Victoria and Albert and British Museums and there is a good example in the Tate Gallery.

Crab popular name for several kinds of Crustacea (q.v.) but properly restricted to those with four pairs of walking legs preceded by a pair modified as claws and with a short abdomen tucked beneath the cephalothorax and not used for swimming. There are a great many different species mostly found in the seas all over the world but in warmer countries a few inhabit fresh water and some live on the land paying periodical visits to the sea. The commonest on the British coasts are the edible crab the green crab and the thornback

spreading tree found in woods and hedges with simple egg shaped serrate leaves flowers in a sessile umbel styles combined below fruit hollow beneath. The branches are thornless the white flowers delicately shaded with pink and the fruit nearly round and extremely acid. It was formerly much used in the making of verjuice and in the preparation of pomatum so-called from *pomum* an apple. Flowers in May.

Crabbe George (1754-1837) English poet was a country doctor and later a clergyman. The experience and knowledge which he thus gained of rural characters and customs were put to good use in his verse stories of rustic life. These were published as *The Village* (1783) *The Parish Register* (1801) *The Borough* (1810) and *Tales of the Hall* (1819). He portrayed life as it was and probably influenced Wordsworth and the romantics by his pictures of Nature.

Cracking a term used in the petroleum industry for the process of heating generally under pressure heavy oils such as gas and fuel oils to temperatures higher than those used in straight run refining. The object of the cracking process is to break down the large and heavy molecules constituting these heavy oils into the smaller units which form the lighter petroleum fractions utilised as motor spirit. Cracking occurs in both liquid and vapour phases but this division is not absolutely accurate since in liquid phase cracking operations a certain amount of the process occurs in the vapour phase and vice versa. A more scientific distinction is by the temperature employed in the cracking processes (a) that which operates below c 500 C and yields chiefly gasolines containing aliphatic constituents and (b) those which take place above c 500 C and yield principally aromatic gasolines.

Gasoline produced from heavier oils by cracking differs in some respects from the straight run distillate. Its properties will depend upon the type of



King (Molucca) Crab

which is sometimes eaten. Related to the last is *Kampfer's crab* a Japanese species the largest known crustacean in which the span of the claws may reach c 10 ft. The hermit crab (q.v.) is a crustacean of a different group. The king crab (q.v.) is an arachnid not a true crab. Crabs are mostly carnivorous varying their diet with season. A few are vegetable feeders.

Crab-apple family *Rosaceae*. A small

cracking process, but generally cracked gasolines have higher "anti-knock" ratings than straight-run, though they have the disadvantage of tending to gum on standing, forming sticky resinous compounds. This last can be largely eliminated by the addition of stabilisers and by precautions in refining. The cracking of heavy oils for the production of gasoline is an extremely important phase of the petroleum industry, for of the total amount of motor spirit sold to-day about one-third is produced by these processes. An interesting rival method of producing motor spirit from heavy oils is that of hydrogenation (*q v*).

Cracow (or *Krakow*) (1) Province in Poland bordered E by Lwow and W by Polish Silesia. Area 6736 sq m, pop 1,993,000. It comprises 24 districts, the chief towns are Cracow, Tarnow, and Nowy Sacz. There are salt-mines at Bochnia and Wieliczka, whilst wheat, oats, and rye are the main agricultural products. The province was, until 1918 known as W Galicia. (2) Capital town of the above, on the left bank of the R Vistula, the intellectual centre of Poland. The old part of the city contains the ruins of the old fortifications, the Stanislaw Cathedral (11th cent), where the Polish kings were crowned and buried, the Church of St Mary, dating from 1276, the castle, part of which is 14th cent, the Jagellonian University, founded in 1397. The chief industries are tobacco, leather, cloth, chemicals and soap, and there is a large trade in cattle, timber, wine, salt, and agricultural products. Zinc and coal are mined in the vicinity. The district and town were in Austria's hands from 1846 to 1918. Pop 205,300.

Craddock, Sir Christopher (1862-1914), British sailor. Entered the Navy, 1875, and served in Egyptian campaign, 1884, and the Sudan, 1891. Commanded the naval brigade at the relief of Peking, 1900, and relief of Tientsin. Appointed rear-admiral, 1910. He was in command of a

squadron off Mexico in 1914, and set out to protect S trade routes threatened by the German Admiral, Von Spee. The two squadrons engaged in battle off Coronel, Chile, November 1 1914, and Craddock went down with his ship, *Monmouth*.

Craddock, a town and district in Cap Colony, S Africa, c 125 m inland from E London. The main occupation is cattle-breeding, and a large trade is done in wool, mohair, and ostrich feathers. Pop c 7000.

Craig, Edward Gordon (b 1872), English author and play-producer, the son of Ellen Terry. His stage designs were revolutionary in their treatment of scenery and lighting. He has produced in London, Florence (for Duse), Copenhagen, and Russia (for the Moscow Art Theatre). His works include *The Art of the Theatre* (1911) and contributions to *The Mask*, which he founded in 1908, and which is published in Florence.

Craigavon, James Craig, 1st Viscount (b 1871), Irish politician. Took part in S African War, represented Co Down in Imperial Parliament (1906-21), as a Unionist. Colleague of Sir E Carson, 1914. Treasurer of H M Household, 1916-18, Secretary to Ministry of Pensions, 1919-20, and Financial Secretary to Admiralty 1920-1. On the establishment of a separate Government in Northern Ireland, 1921, he became its first Premier. He was created baronet in 1918 and a peer in 1927.

Craik, Dinah Maria (1826-1887) *née* Mulock, was the author of *John Halifax, Gentleman* (1857). This very popular novel had been preceded by *The Ogilvies* (1849) and *Agatha's Husband*, and was followed by stories for children and other novels and essays comparatively little known.

Craiova (or *Krajova*), a town in Rumania, c 120 m W of Bucharest, on the R Jiu, it is capital of the province of Olténia, and former cap of Little Wallachia. It is the centre of rich pasture and agricultural land, and possesses carriage and rope factories,

and manufactures soap, candles, rather and terra-cotta. Pop 63 100

Crake, see CORNCRAKE

Cram, Ralph Adams (b 1863) a well known American architect consultant or the Cathedral of St. John the Divine now being built in New York. His books on architectural subjects include *The Ruined Abbeys of Great Britain and Halted Towns*

Crambo an old guessing game very popular in the 14th cent. One player hinks of a word and mentions another word with which it rhymes; the other players try to guess the word defining the word guessed by a synonym without actually naming it. e.g. 'A word hyming with dog' Is it a mutt?

No it is not so. Is it a pig?

Yes it is dog. In *Dumb Crambo* the word guessed has to be portrayed a pantomime without speaking. Two ideas are chosen, taking turns in suggesting the word.

Cramp a severe spasm of certain muscles usually of a limb but often of the chest or abdomen. Cramp in the respiratory muscles of swimmers often has fatal results. Certain people are always liable to cramp on lying or sitting in an unnatural or strained posture. Exposure to cold or severe fatigue also promotes cramp. Relief is usually obtainable by moving the limb and by massage of the affected muscles. A peculiar type known as

writers' cramp looked upon as nervous in origin is sometimes very resistant to treatment unless the patient can change his occupation and co-operates intelligently with his doctor. The heat cramp of miners and stokers follows excessive loss of salt from the body in perspiration. It is aggravated by drinking plain water but can be cured by drinking dilute salty water.

Cranach, Lucas (147-1553) German painter and engraver. Nothing is known of his early life and training. The first of his known paintings *The Rest of the Legion* is dated 1504 at which time he was working at Wittenberg in the service of the Elector of

Saxony. Here he later possessed both a chemist's shop and a printing press which was made use of by his close friend Martin Luther. He painted and engraved numerous portraits, hunting scenes and a number of religious works many of which reveal him as a follower of Luther's doctrines among them may be mentioned his *Adam and Eve with the Serpent*. He also took as his subjects incidents from classical mythology. Cranach's paintings have a primitive simplicity—almost a naïveté—of outlook and a certain stiffness of drawing combined with considerable delicacy. His figures tend to be silhouetted rather than modelled nor had he any exceptional gifts as a colourist. But his compositions are lively and many of his female figures are remarkable for an awkward and youthful grace. His sense of humour is shown in several of his works and the *Fons Jovientulus* of the Berlin Gallery which was actually completed by one of his sons is a remarkable record of the quaintness and directness of his pictorial ideas. All three of his sons John, Luca, Hans and Lucas were painters. Four of his works are in the National Gallery.

Cranberry a hardy pink flowered evergreen with straggling wiry stems and small tough leaves. The American cranberry produces the best fruit and is a favourite for cooking.

Crandbrook, Gathorne Gathorne-Hardy 1st Earl of (1814-1906) British politician. Called to the bar 1838 he was elected M.P. 1856. Was Under Secretary for Home Affairs 1858-9. Home Secretary 1868-8. Secretary for War 1884. Secretary for India 1873 and President of the Council under Salisbury 1885-6. He was created earl 1890.

Crane, Stephen (1871-1900) American author. His second novel *The Red Badge of Courage* (1895) a psychological description of the mind of a soldier in action brought him immediate fame. He became a war correspondent which

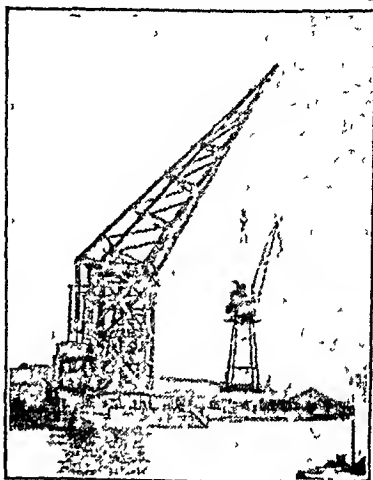
include ventures in free verse, appeared in *Black Riders* and *War is Kind*. He visited England as a friend of Joseph Conrad. Crane died of consumption at the age of 29.

Crane, Walter (1845-1915), English painter and decorative artist, was born at Liverpool, the son of a portrait-painter. He was brought to London in 1867, and two years later was apprenticed to a wood-engraver. Ruskin and the Pre-Raphaelites and, above all, William Morris, were the chief artistic influences in his life. He exhibited *The Lady of Shalott* at the Royal Academy in 1862, and subsequently illustrated a whole series of books for children and for adults, and produced decorations for the publications of the Kelmscott Press. A Utopian Socialist like Morris himself, he drew cartoons for Socialist periodicals, and designed banners, including that still carried by the Hampstead Labour Party. He endeavoured to introduce art into the homes of the people by means of his designs for wall-papers, pottery, and fabrics, founded the Arts and Crafts Exhibition Society in 1888, and in 1898 became principal of the Royal College of Art.

Several of his paintings, such as *The Bridge of Life*, are fairly well known, as are also his illustrations to *The Shepherd's Calendar* and *The Faerie Queene*. His lectures, delivered at the Manchester Municipal School, when he was director of design from 1894 to 1896, have been republished as *The Bases of Design and Line and Form*. This work is represented in the Tate Gallery.

Cranes are mechanisms used for lifting bodies, transporting them over a limited distance, and lowering them again. The simplest type of crane is of the *overhead travelling* type. This consists of a trolley running on an overhead rail or rails. On the trolley is some form of hoisting gear, usually a chain or wire rope running over pulleys, and carrying a hook or other form of grip, which can be raised and lowered by means of a drive, either

electrical, or formed by an endless chain hanging down to be within reach of the hand. Such a crane has a range



20-ton Hoisting a 7-ton Crane

limited to a straight line between two points. The two ends of the rail or rails may, however, be carried on trolleys running on rails at right angles to it, and also driven by electrical or other power. The hoist then has two motions at right angles to one another, and cranes of this kind are now regularly fitted in large machine shops, enabling heavy objects to be lifted from any part of the floor and deposited on any other part. A type of crane constructed in a great variety of forms is the *jib crane*, the essential feature of which is a long beam or jib which is set horizontally or at an angle, supported at its lower end in such a way as to be able to take thrust, and usually having its upper end held by the tension of chains or wire ropes which can to some extent be adjusted. The load is suspended from a chain or rope running over a pulley at the upper end. In the very common type of *steam crane* this pull is balanced by the weight of the engine and the boiler. In other, fixed types of crane, it may

be taken by the provision of legs anchored to the ground. Disastrous accidents are not infrequent caused by the upsetting of cranes or the breakage of their supports under undue loads. For very large cranes the jibs are frequently made of girder construction the top of the jib being bent over and the load being taken by the tension and compression of the parts of the girder.

The largest modern cranes are generally built on a combination of the overhead travelling principle with the jib this being a horizontal cantilever girder structure supported on a steel tower and provided with rails on which runs a trolley carrying the hoist. The weight of the load is balanced by the weight of the other end of the cantilever which is sometimes greatly prolonged. The central tower and frequently an extension downwards of the end of the cantilever run on rails. This type of crane is often called a *Hammer head* (Fig 3) or when the cantilever is lengthened greatly a *transporter crane*.



Crane

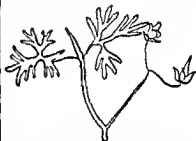
Cranes form a family of large graceful long legged and usually long beaked wading birds. They are related to the bustards and plovers and not as was once supposed to the herons. They feed mainly on grain and other vegetable food. The common European species formerly nested in Great Britain but is now only a casual visitor on its annual migration from N. Europe where it spends the summer and breeds to Central Africa and India.

Cranes

Crane s Bill (*Geranium*) herbaceous plants of the order *Geraniaceae* akin to the Wood Sorrel and Balsam and taking their name from the fancied resemblance of the fruit to the beak of

have a loud trumpeting call. There are many different kinds found in various parts of the world but there is none in New Zealand or S. America. The best known are the Common and Demoiselle cranes of Europe the Japanese crane the Sarus crane of India the Native Companion of Australia the Canadian crane and the Crowned cranes of Africa.

Crane s Bill (*Geranium*) herbaceous plants of the order *Geraniaceae* akin to the Wood Sorrel and Balsam and taking their name from the fancied resemblance of the fruit to the beak of



Crane Bill

a crane. About a dozen species occur in Britain some being perennial others annual. They frequent woods meadows and road sides and flower at various times from May to September attaining a height of about a foot.

Cranmer Thomas (1489-1536) Archbishop of Canterbury and Protestant martyr was ordained in 1523 after the death of his wife. In 1529 he entered the service of Henry VIII going to Rome the following year in order to obtain the divorce of Catherine of Aragon. He was appointed Archbishop of Canterbury in 1532 having just married again. At his consecration he swore allegiance to the Pope only in so far as was consistent with all grace to the King and in his Court declared Henry VIII's marriage null and void. During the reign of Edward VI Cranmer was largely responsible for the issue of the

Second Prayer-Books (1548 and 1552) He acquiesced in the act of Edward VI in devising the crown to Lady Jane Grey and was imprisoned on the accession of Mary As a Protestant he was condemned to death for high treason and excommunicated He recanted, but at the moment of his execution at the stake he withdrew his recantation



Thomas Cranmer

Cranmer is usually looked on as a weakling But his final end, his intercession for Sir Thomas More and Bishop Fisher, as well as his later courageous attack on the Mass, show that he did not lack resolution His weakness lay less in moral infirmity than in his belief in the right of the State to determine religion It was in this spirit that he signed his recantation of his Protestantism But his conscience was too strong for his consistency, and he renounced his recantation and met his death with resolution

Crap-shooting, a form of gambling with dice specially popular in the U.S.A. Two dice are rolled or "shot" from the open hand, a throw of 7 or 11 (*nick*, or *natural*) wins all stakes, 2, 3, or 12 (*crap*) loses all Any other number (a *point*) entitles the thrower to continue till he wins by throwing the same number again, or loses by throwing the 7

Crashaw, Richard (c. 1612-1649), English poet, was a friend of Abraham Cowley and, like him, fled to France during the Civil War His poems are religious in character and of the "metaphysical" school in style, they include *Epigrammatum sacrorum liber* (1634), *Steps to the Temple* (1646) and *Carmen Deo Nostro* Crashaw, who adopted Roman Catho-

licism in 1641, was a great lyricist and had a deep influence on many later poets, e.g. Francis Thompson

Crassulaceæ, the stonecrop family of herbs and shrubs, with thick, fleshy leaves and starlike flowers found in most parts of the world, especially S. Africa They grow in the driest regions, where neither grass nor moss can live, on naked rocks, old walls, on sandy, hot plains, alternately exposed to the heaviest dews of night and the fiercest rays of the noonday sun, having the power of laying in, during the rainy season, a large store of moisture which they obstinately retain, and requiring no further nourishment save what they derive from the atmosphere

Crassus, family name of the Roman plebeian gens Licinia Publius LICINIUS CRASSUS, consul 131 B.C., a noted orator, was killed by the Thracians while on an expedition to Asia, 130 Lucius LICINIUS CRASSUS (140-91 B.C.) was an orator, consul, and censor His law limiting the franchise, 95 B.C., was one of the causes of the Social War Publius LICINIUS CRASSUS, consul 97 B.C., passed various sumptuary laws and suppressed the practice of sorcery Marcus LICINIUS CRASSUS, the Triumvir (c. 115-53 B.C.) amassed enormous wealth, principally by traffic in slaves He was exiled by Marius and Cinna, but was received back by Sulla and, as prætor, defeated the rebel Spartacus at Rhegium, 71 B.C. He was elected consul with Pompey, 70, and in 60 joined Caesar and Pompey in the First Triumvirate, which destroyed the power of the Senate Elected consul with Pompey in 55, he took over the control of Syria and invaded Parthia Crassus was defeated at Carrhæ and executed by Surenas, the Parthian general

Crater. (1) a large earthenware vessel used for mixing wines in Greece and Rome Decorated specimens have been found (2) The outlet of a volcano

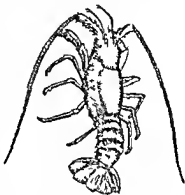
Crawford and Balcarres, Earls of.

The first of the barons of Crawford head of the Scottish house of Lindsay was **WALTER DE LINDSAY** an Anglo-Norman baron of David I's reign (1140-53). The 10th Lord of Crawford **SIR DAVID LINDSAY** was created 1st Earl of Crawford 1397 he & Elizabeth daughter of Robert II. **ALEXANDER** the 4th or Tiger Earl opposed James II but submitted to him 1452. **DAVID** the 6th Earl was created Duke of Montrose 1488 for supporting James III against the barons held many high offices and was ambassador to England. **ALEXANDER**, heir to the 8th Earl was disinherited for his crimes 1537 and the title passed to **DAVID LINDSAY OF EDOELL** later reverting to Alexander's son **DAVID** (1558). Through fighting on the Catholic side during the Reformation and supporting Mary Queen of Scots and her grandson Charles I in the Civil Wars that followed the elder Lindsay family forfeited their title. **LUDOVIC** the 16th Earl being exiled after the Royalist defeat at Marston Moor 1644. The earldom passed to **JOHN** (c. 1598-1678) of the Byres branch of the Lindsays. His great grandson **JOHN** (1700-1749) distinguished himself at the battles of Dettingen and Fontenoy. The Byres branch came to an end in 1808 and the earldom after a period of dormancy reverted to the Balcarres line in **JAMES LINDSAY** in 1848 who thus became premier Earl of Scotland. His son **ALEXANDER** (1812-1880) was the author of *Lines of the Lindsays* and other works. **JAMES LUDOVIC** (1847-1913) 6th Earl was a well known astronomer and President of the Royal Astronomical Society 1888-9. The 7th Earl **DAVID ALEXANDER EDWARD LINDSAY** (b. 1871) was a member of the Cabinet in 1916 and 1917.

Crawford, Francis Marion (1854-1909) American novelist travelled in the East and studied Oriental languages. His works include *Mr Isaacs* (1881), *Don Quixote* (1891), *The King of Prague* (1891), *The White Sister* (1909) and two plays—*A Cigarette*

maker's Romance (1890) and *Francesca da Rimini* (1907). He died in Italy of which country he had written several historical studies.

Crayfish a freshwater crustacean resembling a small lobster. It is found in streams in England and on some parts of the Continent is considered delicate eating. It is omnivorous and various species are found in Asia N. America Madagascar



Cr fish

Australia New Zealand and S America

Cream, the thicker substance that rises to the top of fresh milk which is allowed to stand. It contains all the constituents of milk with a larger but variable quantity of solids. A medium cream contains 38 per cent. butterfat 6 per cent. albuminoids and 2.5 per cent. milk sugar. The butterfat content varies between 18 and 56 per cent. Devonshire clotted cream is made by allowing the milk to stand in shallow pans 12 hours at 60° F and then greatly heating to 180° F till the surface becomes wrinkled. More cream is separated by this system it is more easily churned and the scalding cures taints. Devonshire cream contains 67.5 per cent. butterfat. Cream has a very high food value.

Cream Buns To Make. Place choux paste in a forcet with $\frac{1}{2}$ in nozzle

Hold perpendicularly to a greased baking-sheet, almost touching it. Squeeze and raise sufficiently to allow a little heap to be formed. Remove foreer, by giving it a sharp twist and jerk. Cover with tins and bake in a hot oven (410° F) c 30 mins. Make a hole in side. Force cream mixture in. Dust with icing sugar.

Cream of Tartar (*potassium bitartrate*), $\text{KHC}_4\text{H}_4\text{O}_6$, is the pure salt obtained by the recrystallisation of wine-lees or *argol* (qv). It is used in the manufacture of baking-powder and medicinally as a purgative and diuretic.

Cressy, Sir Edward Shepherd (1812-1878), English historian. His works include *The Fifteen Decisive Battles of the World* (1851), and a *History of England* (1870).

Creatine (*methyl-guanidine-acetic acid*), is one of the naturally occurring amino-acids (qv). It is found in meat juice.

Creation, see GENESIS.

Creative Evolution, the name given by Bergson (qv) to one of the principal tenets of his philosophy. He asserts that evolution is not, as Darwin claimed, purely mechanistic, that fortuitous or natural selection is not the sole means of progress, and that inherited characteristics and the effect of environment do not manufacture, but are *used by*, the individual, perhaps unconsciously, in an act of self-creation. A similar idea is put forward by Lamarck and G. B. Shaw (see the Preface to *Back to Methuselah*).

Crébillon, Prosper Jolyot de (1674-1762), French playwright, is best known for his classical tragedies, which include *Atrée et Thyeste*, *Rhadamisthe et Zénobie*, and *Electra*. They were successful in his day, but are now little read. His son, CLAUDE PROSPER JOLYOT CRÉBILLION (1707-77), wrote several licentious novels, including *Les Amours de Zéokinzul* (1740).

Crécy (or *Cressy*), village in the department of Somme, France, on the R. Maye, 12 m N of Abbeville. It is noted for the great English victory

of 1346, known as the Battle of Crécy, (Hundred Years' War), wherein the English under Edward III routed a largely superior force of French under Philip VI. The French losses amounted to over 31,000, including the King of Bohemia, 10 other princes, and c 1200 knights. Crécy is the first English battle in which cannon were used, but the victory was due to the shooting of the long-bow men.

Credence Table (or *Credence*): (1) A "tasting" table used in Italy in times when attempts to poison princes and nobles were a common practice, (2) a small table in a church by the side of the altar on which the bread and wine are placed ready for the Eucharist.

Credentials, official documents issued to a representative or agent guaranteeing his status and authority.

Credi [KRĀ'DE] **Lorenzo di** (1457-1537), Florentine painter, worked with Leonardo da Vinci and Perugino under Andrea Verrocchio. He produced a large number of pictures, including many paintings of the Madonna and Child, two examples of which may be seen in the National Gallery. He could not approach the greatness of Leonardo, nor had his work the scope and power of that of Perugino, but he was a sound and conscientious craftsman, and by no means untalented. He had considerable standing in Florence, and his work shows evidence of sincere religious feeling.

Credit, a sale on trust, delivery of goods which are to be paid for at a future date. A bank *lends credit* by allowing depositors to draw funds which they are to repay at a future date. The importance of credit in modern business is particularly great as large volumes of credits may cancel one another without the necessity of any cash transfer, thus multiplying greatly the volume of business that can be done with existing money stock. See also BANKING AND CREDIT.

Credit Note, written acknowledgment given by a seller of goods to the

buyer in lieu of cash and crediting him with a certain sum of money either overpaid or deducted from the sale price on account of a subsequently discovered defect in the goods

Cree see RED INDIANS

Creed (Lat. *credo* = I believe) a confession of faith particularly an official summary of the beliefs of the Christian Church or of a section of it. The name is most often applied to the three historic creeds found in the Church of England Prayer Book—the *Apostles' Nicene* and *Athanasian* Creeds. The first of these traditionally ascribed to the twelve apostles who are said each to have contributed a clause probably originated in Rome and may be traced back to the 2nd cent. The second was drawn up on the basis of an earlier document emanating from Jerusalem by the Council of Nicæa (q.v.) and subsequently added to by the Council of Constantinople (381). The Athanasian Creed is not strictly a creed at all but a confessional hymn probably not older than the 5th cent.

Important modern creeds include the Confession of Augsburg (1530) the first systematic summary of the Lutheran position in credal form the English Thirty-nine Articles the Westminster Confession (q.v.) of 1648 Presbyterian and Calvinist and the Creed of Pope Pius IV a reaffirmation and extension of the Nicene Creed drawn up by the Council of Trent.

The Eastern Orthodox Church in addition to the Nicene Creed makes use of the Orthodox Confession drawn up by Peter Mogila Archbishop of Kiev in 1640.

CONSULT A. E. Burn *Introduction to the Creeds* E. C. S. Gibson *The Three Creeds* Denzinger *Enchiridion Symbolarum*

Creek Indians see RED INDIANS

Creeping Sunflower see ASPERULA

Crefeld [KRE FELD] town in Rhinish Prussia c 16 m N.W. of Düsseldorf lying back from the Rhine. Crefeld is well planned with fine public buildings the Friedenskirche and town

hall. Silk and velvet are chief manufactures and engineering chemicals and dyeing are important. The town dates from the 12th cent. and was occupied by the French under Napoleon. Pop. c 166 000.

Creighton, Mandell (1843-1901) English historian succeeded Dr Temple as Bishop of London in 1897. He is known for his *History of the Papacy* (188-94) and his studies of Simon de Montfort and figures of the Tudor period. He founded the *English Historical Review* (1886) and was interested in the educational developments of his day.

Cremation, the burning of the dead commonly carried out in all ancient countries except Egypt where embalming was practised. In India and the Egean where the dead were buried in sepulchres and stone graves and China where earth burial was the rule. This ancient custom was reversed throughout Christendom by the doctrine of the resurrection of the body and by the influence of Jewish religious ritual. It is still practised as it has always been throughout the greater part of Asia. Modern cremation popularised on hygienic grounds was first scientifically perfected by Sir Henry Thomson. An English society for the promotion of cremation was founded in 1874 and acquired a site at Woking in 1878. At first the Home Secretary refused to allow cremation but the legality of the practice was admitted in 1894 and it became common towards the end of the century precautions being always taken to discover the true cause of death. Cremation is particularly advocated for the disposal of victims of infectious disease. In 1932 there were 24 crematoria in Great Britain (6315 cremations); 5 in France 109 in Germany (61 200); 36 in Italy 5 in Austria (3963); 10 in Czechoslovakia (5441); 9 in Sweden (1521) and 9 in Denmark (300).

Crème de Menthe, see LIQUEURS

Cremona (1) Fertile agricultural province in Lombardy Italy. Wine

and silk are produced Area, 685 sq m, pop (1931) 361,840. (2) Capital town of (1) on the left bank of the Po. Founded by the Romans in 218 B.C., the city has changed hands many times belonging to Spain in 1536 and Austria in 1814. Cremona is noted for its musical instruments, especially violins, Stradivarius, Amati, and Guarneri having lived there (17th cent). The town is rich in old buildings including a 13th-cent town hall and a 12th-15th cent cathedral. Pop 63,300.

Cremorne Gardens, once a pleasure resort on the left bank of the Thames, where the Lots Road Power Station now is, opened in 1817. It is said the first dog show was held here in 1801. The magistrates refused to renew the licence in 1877, and the Gardens were sold for building purposes.

Creole, a word used to describe persons, not of aboriginal race, born in the W Indies, parts of America and S America, Mauritius, and other Spanish or French colonies. It does not imply mixed blood, a creole may be of any race not indigenous to the place where he was born. Creole plants and animals are those of non-indigenous stock. The word was originally used to describe the descendants of Spanish colonists of the W Indies. In the W Indies, America, and Mexico, the word indicates white people, in Mauritius, Réunion, etc., the black. The difference between white creoles and pure Europeans is due solely to different environment, climate, etc., and not to any difference in extraction.

Creosote, generic term applied to acid liquors which are obtained during the destructive distillation of wood, and also to a fraction obtained in the distillation of coal-tar.

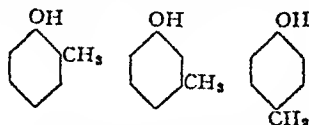
Wood creosote is obtained from beech and other woods, and contains various phenols, such as ordinary phenol, guaiacol, and cresol. It is used medicinally as an antiseptic, and also for the preparation of *creosote carbonate*, obtained by passing carbonyl

chloride through the liquid. This product is employed in medicine for treating bronchial affections by inhalation, creosote itself is also used for this purpose. Coal tar creosote differs considerably in composition from wood creosote, consisting of the fraction distilling from coal tar between 230°-270° C, and is composed chiefly of naphthalene, anthracene, and other aromatic products. It is poisonous, and is used as a wood preservative and to a lesser degree as a disinfectant. The yield of creosote from an average sample of coal-tar is c. 21 per cent.

Crêpe de Chine, originally a mixed silk and wool now usually a pure wool fine fabric woven so as to give a slightly crinkled effect when put through a special finishing process.

Crescent, a geometrical form resembling that of the moon in its first quarter, used as a charge in heraldry. It is best known as the symbol of the Ottoman Turks by whom, according to tradition, it was adopted from the Byzantine symbol after the fall of Constantinople in 1453, but actually it was used by the Turks before this. It may have originated from an Illyrian symbol. It is disputed that the crescent has anything to do with the new moon. It was not an original symbol of Islam, as the cross was of Christianity, but later became so.

Cresol. The cresols, hydroxy-toluenes, or methyl-phenols ("cresylic acid"), are organic compounds present in the crude phenol obtained from coal-tar. They have the formula $C_6H_4(CH_3)OH$, and exist in three isomeric forms, *ortho*-cresol, *meta*-cresol, and *para*-cresol, whose structural formulæ are the following:-



The three cresols are not in practice separated, but are used in the mixed form, containing roughly the same

amount of each as antiseptics being rendered soluble in water by the addition of soap. Lysol is a soap-and-water emulsion of the mixed cresols. See ANTISEPTICS. Para-cresol is found in bad eggs.

Cress is best grown in small lots sown sparsely at intervals of a week in fresh fine soil. It must be cut when tender green short and plump. It becomes worthless when it passes this stage and should be dug in as green manure or occasionally allowed to run to seed.

Crest see HISSALDAY

Cretaceous System, the youngest series of beds of the Mesozoic epoch.



Britain in the Lower Cretaceous. After Will.

Generally they occur between the Jurassic and the Eocene or oldest beds of the tertiary epoch.

In Great Britain they are especially important as they include the Greensands and the Chalk and are not easy to separate from the underlying Jurassic nor do they exhibit well marked divisions.

In many other places however such as the United States there is a definite break in the middle of the system the lower half being sometimes classed as an entirely different system. For correlating the beds in different countries the ammonites as usual are the most suitable fossils.

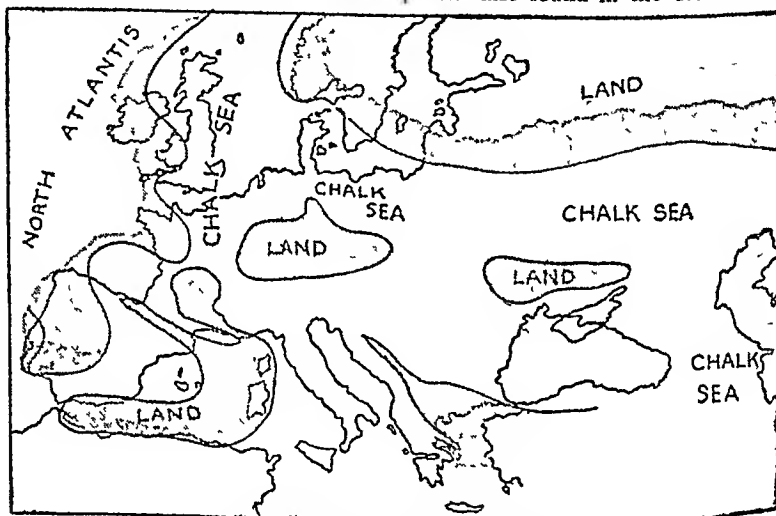
In Great Britain the earliest cretaceous deposits are the Wealden Beds though these are not really separable from the Purbeck Beds at the top of the Jurassic and are often included in the latter formation. In Purbeck times the S. of England was largely covered by a shallow lagoon which became further enclosed to form a Wealden Lake which may however have still been open to the sea on the S. This lake was mostly freshwater and probably extended as far N. as the N. Downs and Salisbury Plain and W. to the border of Dorset and Devon. The rest of the S. of England was probably a low land covered with rich vegetation in which the dominant animals were great reptiles.

The Wealden beds are largely sands below and clays above and in the Weald of Sussex include ironstone clays which formerly were of great importance as a source of iron.

While this lake covered part of the S. of England the area now occupied by Yorks and Lincs was invaded by a N. sea which stretched L. as far as Russia the two being separated by a ridge across the Midlands. The sea deposited the Speeton clay which in Lincs included sandstones and ironstones and of which the lower part may be Jurassic. Then a marine invasion of the Wealden lake took place and the S. sea reached the ridge running from the Midlands under London to Belgium but did not overlap it for any long period of time. However it laid down the Lower Greensand over the S. of England as far W. as Dorset. Following this came a further and much larger marine transgression which overflowing the dividing ridge at last united the two areas of deposition.

At first the deposits laid down in this sea were still different in the N and S regions. In the Yorks and Lincs area a Red Chalk, now well exposed at Hunstanton, was deposited, while over the S area a stiff blue clay, the Gault (*qv*), was laid down. But soon a pure soft white limestone, the Chalk, overspread both regions, stretching from Ireland to Russia. Recent work has shown that the Chalk was deposited in fairly shallow, though clear, water, not, as formerly believed, in a sea of

non-marine at the beginning, but marine at the end of the period, as in the Boulonnais, at first a part of the Wealden "Lake," the Franco-Belgian coalfield, the United States, Japan, Australia, and the Cape Province of Africa. Throughout the period a deep sea, known as the Tethys, lay across Europe and the basin of the present Mediterranean Sea, extending E to the present Himalayas. The shallow parts of this sea contained peculiar shells also found in the Cretaceous



Europe in the Upper Cretaceous After Wills

considerable depth. With temporary shallow-water periods, this sea went on deepening in Britain until the Upper Chalk period, after which there was a general gradual retreat of the sea.

The Cretaceous of other countries is often difficult to separate from the Jurassic. This is the case in Germany, the Alps, the Himalayas, Japan, Australia, and the United States, in the Baltic region beds regarded as Cretaceous may, in the absence of ammonites or belemnites to prove them such, possibly be of Tertiary age. As in England, deposits tend to be

the S United States and in the W Indies, indicating a probable sea connection. Another series of shells, entirely different, has been found in the Lower Cretaceous of S Africa and the Andes, and may indicate a land connection across the Atlantic between Africa and S America.

The N American noneconformity in the Middle Cretaceous, and the dissimilarity of many of the deposits of that time, have been assumed to indicate considerable earth movements, renewed with much greater force at the end of the Cretaceous period and ac-

accompanied by volcanic activity which led to the outpouring of the great masses of lava now found in the Deccan of India. Two great mountain ranges of the United States the Cordilleras and the Appalachians were elevated at this time.

The Lower Cretaceous of the United States is important to the palaeobotanist as yielding the earliest flowering plants other than those of the pine and fir group. They occur in the form of leaves. In the Upper Cretaceous they are much more numerous. Of higher animals reptiles and fishes predominated in the Cretaceous; birds and mammals were rare. Apart from the ammonites sea urchins were the most important invertebrates.

Of economic products coal is the Upper Cretaceous of the United States and Japan and the Lower Cretaceous of the United States, Alaska and New Zealand may be mentioned. The chalk is used for making lime and cement and the Gault clay for bricks and tiles. The Lower Greensand is used sometimes for glass manufacture and may yield Fuller's earth and building stone. The Wealden beds also yield limestone for building.

Greece. Crete is 150 m long and its width varies between 10 and 35 m; total area 3 200 sq m. The N coast is freely indented; the S more regular; there are several islands to N.E. and S.E. of which the large are Dia, the Yamusades and Kufonisi. The surface is mainly mountainous with high plateaux between the mountains and a narrow coastal plain except in the S. Sphakia department where the rise is almost from the water's edge. Notable mountains from W to E are the Madaras rising to 8000 ft, Mount Kedro, the Psiloriti group culminating in the famous Mount Ida (8100 ft), the Lassithi and the Sitia Mountains. The principal rivers are the Metro-polipotamo which flows across the Messara plain, the Platanos and the Mylopotamo.

The island is mainly composed of metamorphic rocks; there is strong evidence that it was once a part of the Greek mainland and so shares its geological structure. The climate though variable and ranging from snow on the mountains to occasional scorching heat on the plains is healthy and in some of the towns very agreeable. The cultivation of olives is the main occupation and other fruits in

CLASSIFICATION OF THE BRITISH CRETACEOUS

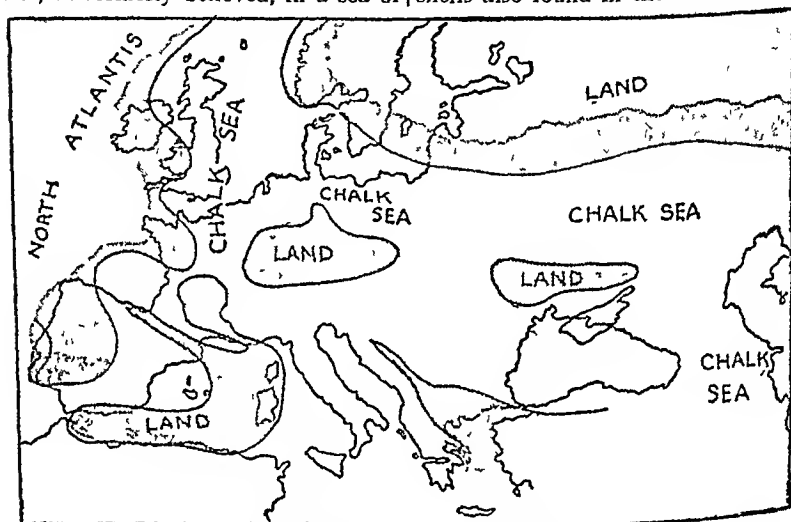
	S.A. 100	S. 100
Upper Cretaceous	Upper Chalk Middle Chalk Lower Chalk	Upper Chalk Middle Chalk Lower Chalk
Lower Cretaceous	Gault and Upper Green sand	Red Chalk, Flint, Limestone and York
	Lower Greensand { Folkestone Beds Sandgate Bed Hythe Bed Atherfield Clay	Torbay Limestone, Flint and the Speck Clay of York
	Wealden Bed { Wessex Clay Torbay W. S. Sand Wadhurst Clay Ashdown Sand	Speck Clay, etc. Torbay Clay and Clay of York Limestone of Speck Clay of York

Sometimes included in the Upper Cretaceous.

Crete, large Greek island in the Mediterranean extending in a W-E direction; its W end is c. 60 m S of the island of Rhodes. It is famous for its olives, lemons, grapes and oranges; the once flourishing silk industry has greatly declined.

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may be delayed until puberty is approached. Unhealthy food and environment, intemperance or insanity in the family history favour cretinism which is expressed by stunted growth, squeaky voice, unhealthy complexion, dirty looking skin, misshapen limbs, flat feet and waddling gait. The sight is fairly normal but hearing, taste and smell are affected, the blood is deficient in haemoglobin and the genital organs underdeveloped. Cretins seldom live more than 30 years unless treated. Treatment which should be given early consists of the administration of extract of thyroid gland in carefully regulated quantities, this has to be continued throughout the life of the patient. The environment may require to be changed and good nutritious food given. Under these conditions a complete cure can be effected.

Creuse department in Central France bordered N by the departments of Indre and Cher S by Corrèze L by Allier and Puy de Dôme and W by Haute Vienne. The chief river the Creuse rises near Fénéux and drains the whole department. The country is mountainous but S there are stretches of pasture. Poor soil and damp climate limit production and the crops of oats, wheat, rye and buckwheat are too scanty even for the inhabitants. Cattle, horses and sheep are raised and there is coal at Ahun. Manufactures are carpets, curtains, woodenshoes and hats. The principal towns are Guéret the capital and Aubusson. Area 2,164 sq. m. pop. (1931) 207,880.

Crensat, Le a town in the department of Saône-et-Loire in Central France. It is a coal and iron district and has important iron and engineering works. Pop. (1930) 35,000.

Crévasse see MOUNTAIN-CLIMBING

Crewe Robert Otley Ashburton Crewe-Milnes Marquess of (b 1858) British politician and diplomat. Lord Lieutenant of Ireland 1897-5. Lord President of the Council Secretary for the Colonies 1908 and Liberal Leader in the Lords. As Secretary for India

1910-15 he accompanied the King and Queen thither to 1911 was responsible for the removal of the capital to Delhi and the reunion of the two Bengals. Was Ambassador to France 1909-8 successfully handling the Ruhr dispute between France and Germany.

Crewe town in Cheshire 241 m. N.W. of Stafford. Originally a small village it is now an important railway junction with large locomotive works belonging to the L.N.E.S. railway. Pop. (1931) 46,001.

Cribb, Tom (1781-1848) English pugilist champion 1809-1894 was only once beaten by Geo. Nicholls in 1805 among others he twice defeated Jem Belcher and the negro Molineux.

Cribbage a card game usually for 2 players said to have been invented by Sir John Suckling (1600-1641). A full pack of 52 cards is used, ace always counting as 1, court cards all count 10 (10th cards) the rest by face value. Game consists of 61 points scored as made with pegs on a special board with a double row of 30 holes on each side and a game hole at each end. Each player has 8 pegs and scores by moving them the appropriate number of holes from left to right. After completing one row (30 points) the pegs are moved from right to left down the inner row after which one point is needed for game hole. If game is made before the opponent has turned the corner it is called a *lunch* and counts double. For 3 players a triangular board with 3 sets of holes is used.

The Deal Six cards are dealt one at a time to each player and remainder placed face-downwards on the table cut and the top card of the lower port on turned up to act as the *starter*. If this is a Jack dealer scores 2 saying

Two for his heels. Each player lays 2 cards face down wards on the table to form the *stock* after which each in turn beginning with the non-dealer or *pone* plays a card face up wards at the same time announcing its pip value the object being to form various scoring combinations viz *Pais* 5 (-

though attempts are being made to restore it. There are no important manufactures, but small quantities of soap, wine, cognac, and leather are produced. A number of efforts have been made to discover the minerals that Crete is believed to possess, and it is now known that there are deposits of sulphur, lead, and iron, but so far little has been done to exploit them commercially.

The population, of Greek origin, is

by Greeks, Romans, Turks, Venetian and again by Turks. It has been the centre of frequent rebellions and matter of concern to the European Powers, owing to the tension caused between Turkey and Greece. After brief war, in which the Powers intervened, the island was declared autonomous (1897), but the King of Greece was empowered to appoint the High Commissioner, and in 1912 Cretan members sat in the Greek Parliament.



Landing place at Canea

composed of Christians of the Eastern Orthodox Church and Moslems in a ratio of c 8 to 1. The total is some 300,000. The chief towns are Heraklion (Candia, 33,000) and Canea (26,500). Administration is carried on by the Greek Government, the island is divided into 4 departments, and ranks as a province, with its own Governor-General. Local government is through 86 local divisions, managed by a mayor and an elected council.

Crete, the seat of one of the world's oldest civilisations, has been occupied

and the island was formally annexed to that country.

For Cretan archaeology and art *see* **ÆGEAN CIVILISATION**

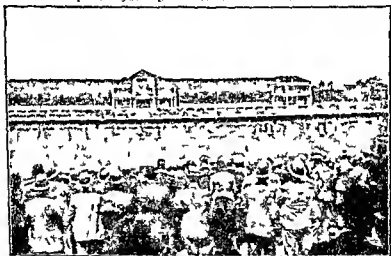
Cretinism, a disease, developed in early childhood, due to absence or deficiency of the thyroid gland or to goitre. The disease is universally distributed, but is commonest in special areas, such as Switzerland or Derbyshire. People subject to the disease, known as cretins, are imperfectly developed in mind and body. Sometimes the onset of the disease

M.C.C.) now the ruling body of cricket wherever it is played. Their headquarters was a ground opened by Thomas Lord (1757-1837) which was moved twice before. Lord's was finally established in 1814 at St John's Wood. The freehold was purchased by the Club in 1866. The earliest known laws of cricket were drawn up by the London Club in 1444 and revised by the M.C.C. in 1888.

The Game is played between 2 teams 11 a side on a pitch 345 long with

in length these measurements remained in force till 1931 when a larger wicket 48 x 9 in was introduced for first-class cricket in England and adopted by many minor clubs in Australia however the smaller wicket has been retained for all classes of cricket.

The bat is of willow with a cane handle (introduced c. 1499) made resilient by the insertion of strips of rubber. The earliest bat, were curved rather like a broad hockey stick. The



London.

a wicket at each end to be defended by the batsman against a ball delivered by one of the opposing side while the other members of this side endeavour to stop or catch the ball when struck or missed by the batsman. The score is reckoned in runs made by the batsmen while the ball is in play crossing from end to end of the pitch. The wicket in early days consisted of 2 stumps with a third or bail laid across them. A third stump was added c. 1770. The dimensions of the wicket were settled in 1817 as 47 in high by 8 in wide with 2 bails 4 in

bat must not be more than 39 in long and 4½ in wide. The ball is of cork covered with red leather its weight of 5½-5¾ oz was laid down in 1774. The length of the pitch seems always to have been 220 yds.

The bowling crease is a white line 8 ft 8 in in length having the stumps in the centre with a return crease at each end at right angles.

The popping crease is marked 4 ft from the wicket and parallel to it and is deemed to be of unlimited length. It originally consisted of a hole in the ground into which the ball had to be

cards of same denomination), 2 points, *Pairs Royal*, or *Prials* (3 cards of same denomination), 6 points, *Double Pairs Royal*, or *Deprils* (4 of a kind), 12 points, *Sequences* 3 or more cards in numerical order, 1 point for each card in the sequence, *Fifteens* 2 or more cards totalling 15 in face value, 2 points ("fifteen-two"). Two or more scores, e.g. a pair and a fifteen may be reckoned together. The total value of the cards played must not exceed 31, the player of the last card which brings the total as nearly as possible to 31 scores 1 point (the "go"), if it makes the total exactly 31, he scores 2. Scores must be announced as made, e.g. A plays a 4, and says "four", B plays a 5, and says "nine", A follows with a 6, says "Fifteen-two," and pegs 2 points.

When all cards have been played, the value of the hands and crib (including the "starter") is reckoned, the crib always belonging to the dealer. The scoring combinations are the same as in play, but *Sequences* may be "double," i.e. a duplicate card may be used to form a second "run", e.g. a 2, 3, and 4, with another 4 would make 2 sequences or a "double run," 6 points, and would also score 2 for the pair of fours. With the aid of the *starter*, sequences may be triple or quadruple, e.g. a run of 3 with 2 duplicates counts 15, 9 for triple run and 6 for the pair royal. Duplicate cards may also be used in the case of *Fifteens*, e.g. a court card or 10 and 2 fives count as 2 fifteens ("Fifteen-four"), 2 "tenth cards" and 2 fives "fifteen-eight," etc. A *Flush*, all 4 cards of same suit, scores 4, a flush in the crib does not count, unless of the same suit as the *starter*, when it scores 5. A hand containing the knave of the *starter's* suit scores "one for his knob."

In *Five-card Cribbage*, 5 cards are dealt instead of 6, 2 being laid out for crib. The non-dealer on the first hand scores 3 (*Three for last*). The crib in this form is more important than the play of the cards.

Crichton, James (c. 1561-1584), the

Admirable Crichton, Scottish scholar, celebrated for his classical attainments and a remarkable memory. In the disputations which were held in place of examinations in his day, he overcame all contestants and proved himself a brilliant logician. His works include several Latin odes of some merit, written in Italy, where he lived for some years. He was killed in a street brawl.

Crichton-Browne, Sir James (b. 1830), English physician, Vice-President of the Royal Institution since 1889. Has published numerous works on lunacy, medical psychology, nervous diseases, and education. He is a member of many English and foreign medical societies, and was knighted in 1886.

Cricket, the English national summer game, is of uncertain origin. Various forms of game with bat and ball were played during the Middle Ages, as shown by drawings in several MSS. dating from the 13th cent., but the name cricket does not seem to have been used before the 16th cent. A game resembling cricket, known as "Hand-in and Hand-out," was barred by statute in 1477.

Cricket began to assume its present form in the first half of the 18th cent., and its popularity steadily increased. Frederick, Prince of Wales, son of George II, died in 1751 through a blow from a cricket ball. There was a cricket club at St Albans as early as 1666. The most important body in the early history of cricket, the Hambledon Club, flourished from c. 1750 till 1791. This little Hampshire village, playing its matches on Broad Halfpenny Down, near Winchester, was capable of defeating "All England," and the fame of such players as William Beldham, John Small, and "Lumpy" Stevens, had much to do with the growing interest taken in the game by all classes. The earliest matches in London were played on the Artillery Club ground, Finsbury, and at White Conduit Fields. The White Conduit Club was remodelled in 1787 as the *Marylebone Cricket Club*.

wicket the former counts the balls in the over and adjudicates on cases of lbw caught at the wicket and run out at the bowler's end the latter decides questions of stumping and run out at the striker's end. The umpires cannot give a decision unless appealed to when their decision is final. The ball must be bowled not thrown or jerked. In early days all bowling was underhand but round arm bowling with the arm level with the shoulder was legalised in 1814 and over arm with the arm raised above the level of the shoulder in 1864.

In *single wicket* a form of the game once very popular but now practically obsolete matches were played between sides of from 1 to 5. With less than 5 aside runs could be scored only in front of the wicket. Only one wicket was pitched with a bowling stump opposite. Large sums of money were often wagered on the results of single wicket matches between prominent players.

County Cricket. The earliest recorded inter-county match took place in 130 between Surrey and Middlesex but the regular County Championship was not organised till 1862 when Nottinghamshire and Gloucestershire

1868-9 Gloucestershire 1871 Hampshire 1863 Kent 1859 (re-formed 1890) Lancashire 1864 Leicester shire 1873 Middlesex 1864 Northamptonshire c 1843 (re-formed 1898)



A. S. Dukeparish

Nottinghamshire 1869 Somerset 1878 Surrey 1845 Sussex 1836 (re-formed 1839 and 1851) Warwickshire 1863-4 (re-formed 1839) Worcestershire 1863 Yorkshire 1863 Yorkshire has now (including 1933) been champion 17 times Nottinghamshire 11 Surrey 10 Lancashire 7 Kent and Middlesex 4 Gloucestershire 3 and Warwickshire once.

The *Minor Counties Championship* was first held in 1895. The *University Match* between Oxford and Cambridge was first held in 18 and has taken place annually since 1838. Cambridge has won 44 matches and Oxford 37 up to 1933. The first *Gentlemen v Players* match at Lords was played in 1900 and the fixture has been an annual one since 1819.



End of Straight Drive

shared first place. The 17 first-class counties with the dates of formation of the county clubs are as follows: Derbyshire 1870 Essex 1864-5 (re-formed in 1866 and 1886) Glamorgan

"popped" in order to run the batsman out. The ball is bowled in "overs" of 6 balls each (8 in Australia), from each

ground from a stroke made with the bat or hand, if he stops with any part of his person, except the hand, a ball

RETURN CREASES

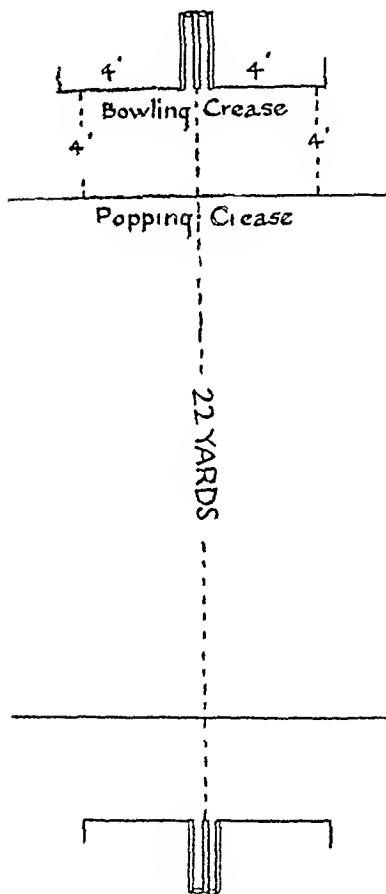
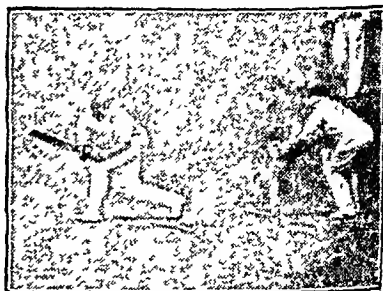


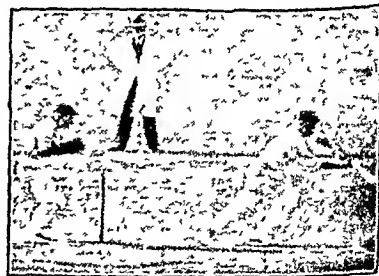
Diagram of Cricket pitch

wicket alternately. The batsman is out if his wicket is bowled down, if the ball is caught before touching the



Leg Glance

which, in the opinion of the umpire, pitches in a straight line between the wickets and would have hit the stumps ("leg before wicket," or *lbw*), if he misses the ball, and his wicket is put down by the wicket-keeper with the ball, or the ball in his hand, while he is out of his ground, *i.e.* not having his bat, or any part of his person, behind the popping crease ("stumped"), if, while running, the wicket is put down before he can make good his ground ("run out"), if in playing at the ball he hits his own wicket, if he wilfully obstructs a fielder, or hits the ball twice, except in order to guard his wicket, or if he handles the ball while in play. The game is controlled by



Cover Drive

two umpires, one of whom stands behind the bowler's wicket, the other behind the striker at right angles to the

190 C P Mead and E Hendren
140 W G Grace 124 F E
Woolley 118 H Sutcliffe 107 and
T Hayward 104 In all classes of
cricket W G Grace scored 217
centuries

Crickets insects resembling grass
hoppers with long antennae and like
them producing their familiar chirrup
by rubbing their horny fore wings
together They are found all over the
world the most familiar British species
being the house cricket common in
atticns of old farm houses and the
mole cricket which lives in burrows in
fields and has the fore-legs thick and
expanded for digging

Cricklade a market town in Wilts
England on the Thames The Church
of St Sampson and the Early English
Church of St Mary have fine towers
Cricklade was important in Saxon
times and in the days of Edward the
Confessor possessed a mint The site
of the castle is marked only by
Castle Hill Pop (with Wootton
Bassett 1931) 11 360

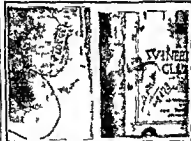
Crief market town in Perthshire
Scotland on R Earn Its fine position
and healthy climate have made it a
health resort Three miles S of the
town is Drummond Castle the keep of
which was built in 1490 by the first
Lord Drummond ancestor of the
present owner the Earl of Ancaster
its gardens are celebrated Woollen
goods are manufactured and there is a
distillery Pop (19 1) 5800

Crime Detection Identification by
finger prints was the first and is still
the most important application of
science to the detection of crime The
system is scientific in essence because
it introduces the element of mathe-
matical accuracy into identification

Finger prints are supposed to have
been utilised by the Chinese for identi-
fication in the 13th cent but there is
great doubt about this Long before
their importance was discovered the
lines on the fingers had been noticed
They were classified by a medical man
named Parkinje in 1819 but they were
not used for identification before 1877

when Herschel the real discoverer of
finger print identification used them
for this purpose in Bengal The dis-
covery was not taken up in England
until 1880 when Faulds again drew
attention to the matter Sir Edward
Henry and Sir Francis Galton deve-
loped the system in its present form

Finger print identification is con-
sidered infallible the chances of dupli-
cation being alike are one in 64 000
millions Occasionally cases arise in
which finger print evidence is rejected
This is due only to the fact that the print
found on the scene of the crime is too
fragmentary to make identification cer-
tain Circumstances alter cases but in
general it is necessary to show twelve
to fifteen points of resemblance be-
tween an impression found on the scene
of a crime and a finger print of the
accused before identity can be assumed



Latent Finger Prints

But the methods of establishing
these points of resemblance increase in
refinement as time goes on In 1914
Dr Edmond Locard discovered with
the help of the microscope an addi-
tional aid to identification

Along the lines on the fingers and
palms of the hands are to be found
certain minute openings the sweat
pores If a photomicrograph is taken
of a finger print these can be counted
and their exact position noted Dr
Locard discovered that the position
and the number of the sweat pores in
a given area are peculiar for each indi-
vidual person

This discovery is of great value

Test Matches The first Test Match between England and Australia was played at Melbourne in 1877, and won by Australia by 45 runs; the first Test Match in England was played at

Zealand (first match, 1930), and A India (first match, 1932). S Africa has also played Test matches against Australia and New Zealand, and the W Indies against Australia.

Other Records The highest total ever obtained in an innings is 1107 by Victoria v NSW in 1926-7. The highest total in a first-class match in England is 887 by Yorkshire v Warwickshire in 1896, and in nine matches 920 by Orleans Club v Rickling Green in 1882. The highest individual score in first-class cricket is 452 not out by D G Bradman for NSW v Queensland in 1929-30; the highest in England is 424 by A C Maclaren, Lancashire v Somerset in 1895. The highest individual score ever recorded in any class of cricket is



Duckworth

the Oval in 1880, and won by England by 5 wickets. The next Test to be played in England, at the Oval in 1882, was won by Australia by 7 runs. This match was the origin of the mythical *Ashes*, the *Sporting Times* publishing an "In Memoriam" notice "in memory of English cricket," which stated that "the body would be cremated and the ashes taken to Australia." Of 129 matches played to 1933 each side has won 51, and 27 have been drawn. The highest total by England is 636 at Sydney, in 1928, by Australia 729 (for 6 wickets) at Lord's in 1930. Highest individual scores are 287 by R E Foster for England at Sydney in 1903, and 334 by D G Bradman for Australia at Leeds in 1930.

"Test" matches are also played against S Africa (first match, 1888), the W Indies (first match, 1928), New



D R Jardine

Zealand (first match, 1930), and A India (first match, 1932). S Africa has also played Test matches against Australia and New Zealand, and the W Indies against Australia. 628 not out by A E J Collins in a junior house match at Clifton College in 1890. A hundred or more centuries in first-class cricket have been scored (to the end of 1932) by J B Hobbs

(1) *A principal in the first degree* is the actual offender the person who with a guilty intention committed or procured the commission of the crime

(2) *A principal in the second degree* is a person who is present aiding and abetting at the scene of a crime e.g. the referee at an illegal fight or a person who keeps watch while another burles a house

(3) *An accessory before the fact* is a person who while not the chief actor in a felony nor present at its commission has actively helped advised or influenced the principals

(4) *An accessory after the fact* is one who knowing that a crime has been committed assists the criminal to escape justice But a wife is not punishable if she gives such assistance to her husband

The classification is no longer very important since principals and accessories before the fact are now subject to the same measure of punishment while in the case of a misdemeanour an accessory after the fact is not criminally responsible at all

Criminology treats of the nature and causes of crime The subject is a complicated one because of the difficulty of placing it upon an exact scientific basis What constitutes a crime in one country does not necessarily do so in another Again statistics are often misleading when it is proposed to compare the incidence of crime in say 1850 and 1900 one must take into account factors such as the increasing efficiency of detection in the latter as compared with the former period Further increase in population may produce the false impression that the incidence of crime is greater in 1900 than in 1850 so that comparative populations must also be taken into account in comparing statistics of different periods Criminology owes its foundation as a separate science to Cesare Lombroso an Italian Jewish Professor of Forensic Medicine author of *L'Uomo Delinquente* (1876) (Criminal Man) The interest of the book is now mainly historical since

the researches of such scientists as Prof Karl Pearson in London have shown Lombroso's statistics and conclusions to be highly unreliable The study of criminology has given rise to two main schools of thought the one regarding the criminal as such by nature the other attributing crime to social organisation environment and educational causes Poverty is an important factor in crime though its influence is not necessarily bad thus it has been found that poor countries such as Hungary Spain etc show comparatively few cases of theft the reason being that wealth is more evenly distributed while in countries where extreme poverty exists side by side with extreme wealth the temptation to crime is greater Other factors to be taken into account are the political and natural conditions of a country

Crimp an agent for supplying sea men by decoy or other illegal means to merchant ships originally covering both the Navy and Army in the time of the press-gangs (qv) This calling usually followed by lodging house keepers has been stamped out by legal enactments in Britain Until recent times it was widely practised on the W. seaboard of the USA where it was called shanghaiing The practice of crimping resulted in considerable suffering as seamen were shipped aboard without any guarantee as to destination or pay In Great Britain to-day crews must be signed on at the Board of Trade office in each port or through accredited agents

Cruan Canal, a ship-canal (constructed 1793-1801) cut across the Mull of Kintyre Argyllshire Scotland from Ardrishaig on Loch Fyne to Cruan on the Sound of Jura It is 9 m long by 24 ft broad and there are 15 locks The canal takes vessels up to 1,000 tons

Crispi Francesco (1819-1901) Italian statesman Participated in the Sicilian revolution in 1848 and the Mazzini conspiracy 1853 and was exiled going to France and England Jimmy Garibaldi 1860 he organised

in 1933 provide for more intimate co-operation between the C I D and the ordinary police force, and for the attachment of detectives at all stations

Criminal Law is the law relating to offences considered injurious to the community as a whole, even though they injure individuals, as in burglary, and even though the offence, legally a crime, is not popularly regarded as such, e.g. failure to repair a highway, or allowing a chimney to smoke excessively. The object of the law is the punishment of the offender, and this distinguishes a crime from a tort (*q v*), in which what is aimed at is compensation of the person injured. Proceedings in crime are termed *prosecutions*, and are conducted in the name of the sovereign. The King may pardon a criminal, but not a civil offence. The person injured by a crime frequently has the right to bring a civil action for damages, but, with a few exceptions, criminal and civil proceedings may not be brought concurrently. The main principles of English criminal law are as follows

The general principle of responsibility is that a wrongful act has been committed with a guilty intention. This is expressed by the legal maxim *actus non facit reum nisi mens sit rea*, i.e. the act is not guilty unless the mind is guilty. In some cases the intention is implied, e.g. every person is presumed to intend the natural consequences of his act, in others it must be specifically proved (see MURDER, BURGLARY, etc.). In a few statutory cases no intention is necessary, as in certain offences against the licensing laws. Certain persons are exempted from responsibility.

(1) *Children* under 7 years of age are held incapable of committing a crime.

(2) *Children* between 7 and 14 years of age are presumed not to have known that they were doing wrong, but this presumption may be rebutted.

(3) An act committed by a *lunatic* is not a crime if, at the time when it

was committed, the doer did not know what he was doing, or, if he did know it, that it was wrong.

(4) *Drunkenness* is not a defence unless it amounts to insanity at the time of the offence, but it may be taken into consideration with regard to the question of intent in cases where intent must be specifically proved.

(5) *Coercion* amounting to a threat of immediate death or grievous bodily harm will excuse any crime except murder.

(6) *Married Women*: it is a good defence in all misdemeanours and most felonies, except treason, murder, manslaughter, robbery, to prove that the crime was committed by a wife in the presence of her husband and under his coercion.

(7) *Self-defence* will excuse a crime provided that there was a threat of immediate physical violence, and the doer used no more force than he believed to be necessary under the circumstances. Extreme want of food will not justify stealing.

(8) *Mistake of fact*, but not of law, will excuse a crime if the mistake was reasonable, and the facts, if true, would have made the defendant's act innocent.

Classification of Crimes In English law crimes are classified as treason, felony, or misdemeanour. The distinction between felonies and misdemeanours is of purely historical interest. Before 1870 felonies were crimes punishable by forfeiture of the criminal's property, and in most cases by death. Forfeiture has been abolished, and the distinction between felonies and misdemeanours is now unreal. Many misdemeanours are punishable as heavily as, or even more heavily than, felonies. Crimes may also be divided into indictable offences, which admit of trial by jury, and non-indictable or petty offences, which can only be tried by a court of summary jurisdiction sitting without a jury.

Principals and Accessories Several persons may participate in the commission of a crime.

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Crispi, Francesco (1810-1901) Italian statesman. Participated in the Sicilian revolution in 1848 and the Mazzini conspiracy 1853 and was exiled going to France and England. Joining Garibaldi 1860 he organised

the expedition which captured Sicily and invaded Rome. He became Italian Minister of the Interior, and effected the accession of Humbert I as king of a united Italy, with Rome as capital. As Prime Minister, 1887-91, he established Italy's place in the Triple Alliance, and introduced internal reforms. Premier again in 1893, he suppressed disorder, but resigned after the Italian defeat at Adowa, Abyssinia, in 1896.

Crispin, St., a saint about whom nothing is known but the legend that with his brother *Crispian*, he gave up his property in Rome and supported himself as a shoemaker until he was martyred under the Emperor Maximilian. The brothers are the patrons of shoemakers, their day is Oct 25.

Criticism, in the arts, is the act of judging and estimating correctly the qualities of a work of art. A work of art here means any manifestation of the Fine Arts, whether it be a building, a piece of sculpture, a picture, a musical composition, or a poem. Literary criticism deals with every kind of literature, in prose and in verse.

In a sense all criticism is parasitic, since a critic cannot exist as such without a work of art on which to fasten, though an artist can exist without a critic. But each helps the other. The artist provides estimable but otherwise unemployed individuals, both of his own and of future generations, with a means of livelihood. The critic, by applying the canons of contemporary taste to his examination of a work of art, restrains the artist and prevents him from running wild, while, by a judicious use of unofficial advertisement, he draws the attention of the world to the artist's work. The good critic also helps to mould the taste of the world which vaguely appreciates but does not understand a work of art, though the power of criticism in this respect is usually much exaggerated.

Having seen that artist and critic help each other, it is necessary to find out what is the duty of the critic.

The plain man may admire a landscape of Claude Lorraine, a portrait of Romney, or a sculpture of Rodin, and say no more about it. If he is inquisitive as well as plain, he will probably ask himself why he has this æsthetic spasm. It is the business of the critic to tell him. The very fact of his having made the judgment "I like this" has turned him into something of an elementary critic. Otherwise he would have gazed on the masterpiece with unseeing eyes and it would have had no æsthetic effect on him whatever. But, having taken the first step in criticism, he must let his subsequent footsteps be guided by someone who has made a long study of the subject.

The artist, as we have seen (*see Art*) has taken his subject to pieces (analysis) and put it together again (synthesis) in his own way, thereby creating something new in his work of art. The critic has first to repeat this process in his own mind and then to find out and unravel the art which the artist has concealed. It may be objected that this is a very futile process. Why, it may be asked, when an artist has taken all the trouble to hide his genius in his work, should someone else, who possibly cannot draw a line or sing a note, go to the trouble of rousing it all out again? The answer is that the critic cannot understand the work properly unless he goes through this mental process, and, unless he understands, he has no business to pose as an artistic lawgiver.

Having reached, as it were, the kernel of the subject, the critic now remembers that there are a number of laws or rules of composition, whether of writing, of painting, of sculpture, or of any of the other fine arts.

The history of these laws is very extensive. The founder of literary criticism was Aristotle, who laid down certain laws to which a work, if good, had to conform. If it violated them it was to that extent bad and not a work of art. Some of his laws are admitted, even to this day, to be universally true. It is impossible here to trace

the historical development of criticism or to do more than mention the names of Longinus, Horace and Quintilian. By the 18th cent. in France and England the laws of criticism had become hodgepodge. The romantic revolution in the 19th cent. has led to the artistic freedom of the present day in which people otherwise intelligent think they can do without laws altogether.

The critic then having remembered his laws be they few or many proceeds to apply them to his subject and the work of art is judged by the extent to which it conforms or clashes with these laws. As the work will probably violate more laws than it observes the criticism is almost certain to be adverse. To such an extent is this so that the very word critical usually implies adverse criticism. There is another reason for the prevalence of adverse criticism. The artist is always in advance of his parasite. The artist racing ahead executes something new and the critic panting after him comes upon the unfamiliar.

We finally come to the matter of criticism. How does the critic criticize? He says that the idea is new (or old) that the treatment is original (or threadbare) and that the æsthetic laws have been followed (or ignored). But this is not enough for him. He is obliged (so he thinks) to clothe his judgments in a guise that is all but unintelligible to the plain man who is waiting to be instructed. He cannot resist the temptation to use metaphor. The metaphor he uses comes almost invariably from another of the fine arts. Thus in criticising a building he admires its rhythm borrowing from music and poetry though only suspension bridges and lofty buildings like the Eiffel Tower (which moves 4 ft. at the top) have any movement at all. In music he complains that the executant lays on his brush too thick in painting that the symphony of half tones is somewhat exotic. Where he is content with simile he will tell us that a violinist's tone had almost a human note and that the flute like

notes of the soprano in the Mad Scene were of amazing purity. Logically therefore the highest possible praise of a violin player is to leave out the human voice altogether and to compare his tone directly to that of a flute. When metaphor and simile have been worn threadbare the critic takes refuge in words and phrases that happen at the moment to be fashionable.

All these failings obscure the fact that there is a very definite place in the world of art for criticism in its constructive as well as in its destructive aspect. Acute constructive criticism such as that of Wordsworth or Coleridge and to a lesser extent of Ruskin can help the artist to produce better things and so make the world more beautiful. We no longer live in an age in which a Phidias, an Ictinus or an Apelles could produce a masterpiece without the aid of a critic. See also LITERARY CRITICISM.

Consult further the works of Matthew Arnold, John Ruskin, Sainte Beuve, Anatole France, Walter Pater. The *Biographia Literaria* of Coleridge and the *Laocoon* of Lessing should also be mentioned.

Criticism. Higher the modern critical study of the contents of the Bible as distinguished from ordinary textual criticism. It discusses the credibility and authenticity of the writings and their general value. The term has come to be associated with attacks on the validity of the Scriptures as evidences of Christianity.

Croatia Slavonia, see YUGOSLAVIA
PAN SLAVISM

Crochet, a knitting with a hooked needle and cotton or thin wool. Chain stitch (Fig. 1) is really the foundation of all crochet developing into the two main stitches—double (Fig. 2) and treble (Fig. 3). The stitches in Irish crochet are the same but are worked over a padding of coarse thread. All the small motifs are done separately and then joined by a filling, a net of fancy chain stitch. Double crochet over the padding is

more usual for the motifs, the padded treble is used only for the stems and petals of the flower motifs

Fine cotton crochet lace is a clever arrangement of the groups of double and treble stitches. The more usual backgrounds for these laces are filet and lacets. Filet is really separate meshes formed by 2 chain with a treble either side (see Fig 4). A lacet background is made by 3 chain, miss 2, 1 double crochet 3 chain, miss 2, 1 treble, and the following row is 5 chain and 1 treble over the treble of the previous row. Repeat these 2 rows (Fig 5). Many patterns can be made

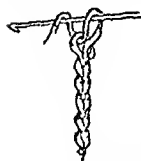


FIG 1



FIG 2



FIG 3



FIG 4

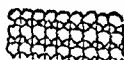


FIG 5

Crochet

by blocks of solid treble on these backgrounds

Crockett, Samuel Rutherford (1860-1914), Scots novelist, previously a minister, wrote numerous stories in Scottish dialect, including *The Sickie Minister* (1893), *The Lilac Sunbonnet* (1894), *The Grey Man* (1896), and *The Moss Troopers* (1912). He was a member of the Kailyard School (qv).

Crocodile, the typical representative of the Reptiles (qv) of the order *Crocodylia*, which includes also the alligators (qv), the caimans, and the gharials (qv). Crocodiles are found in the rivers of tropical Asia, Africa, and America, and bury their eggs in the sandy banks, leaving them to be hatched by the sun. They are carnivorous, and are particularly dangerous from their habit of lying hidden near

the water's edge, waiting for animals or human beings to come to drink.

There are several species, perhaps the most dangerous to man being the estuarine crocodile, which is found from the Bay of Bengal to the Fiji Islands, and often quite far out at sea. It may reach a length of 30 ft, and has been known to attack and overturn small boats.

Crocoite, see CHROMIUM

Croesus [KRL'SUS], last King of Lydia, 560-546 B.C. Conquered Ionia, and became an ally of Sparta. Joined with Nabonidus of Babylon to oppose Cyrus of Persia, but was overthrown by him at Sardis. Many stories of his fabulous wealth were current in Greek legend.

Crofter, a peasant farmer of the Highlands of Scotland. Crofters share certain rights of common pasture while owning arable land individually. The rights may be traced back to an early clan system.

Croix de Guerre, French and Belgian military decorations instituted in 1915, given to members of the forces on land, sea, or in the air for conspicuous bravery. Both the French and Belgian decorations are restricted to those mentioned in dispatches.

Croker, John Wilson (1780-1857), politician and author, thought to have been the first to apply the word "Conservative" in politics, was Secretary to the Admiralty (1809-30), but opposed Peel's repeal of the Corn Laws and the Reform Bills of 1832. In Parliament he became an enemy of Macaulay, who revenged himself by attacking Croker's greatest work, his edition of Boswell's *Life of Johnson* (1831). He also wrote the famous article in the *Quarterly Review* on Keat's *Endymion* (1818), and essays on the history of England and France.

Cromagnon Race, see ANTHROPOLOGY (PHYSICAL).

Cromarty, Scottish port and naval station on the S shore of Cromarty Firth. The sheltered Firth, capable of accommodating the largest vessels, was an important naval base in the

World War. There are local fisheries at the holiday traffic and naval work give most employment. Pop. 1100.

Crome John (1769-1891) English landscape painter was the son of a poor Norwich weaver and was apprenticed as a boy to a house-painter. For relaxation he painted signboards and made sketches until a friend obtained for him a post as drawing master. He was the real founder of the Norwich school of painting and became President of the Norwich Society of Artists on its foundation in 1805. Although he first exhibited in the Academy in 1806 his work was shown mainly in his native town most of it consisting of paintings of the surrounding countryside. Examples may be studied at the National Gallery London where his *Household Heath near Norwich* shows at its best his faithful adherence to nature. His water-colours of Norfolk scenes have definitely established his reputation as one of the finest English landscape painters. His etchings have the same qualities. He is generally known as

Old Crome in order to distinguish him from his son John Bernay Crome (1791-1841) his assistant also a landscape painter of considerable merit who is represented at the Tate.

Cromer Evelyn Baring 1st Earl of (1841-1917) British statesman Secretary to the Viceroy of India (1871-8) as commissioner of the Egyptian Public Debt (1877-8) and Controller General he reorganised the finances of the State. Acted as Agent and Consul General in Egypt (1883-1907) furthering Egyptian education irrigation etc. Through his efforts together with Kitchener's victory at Omdurman (1898) the Sudan was restored to Egypt and Britain. Chairman of Dardanelles Inquiry Commission 1916. Author of *Modern Egypt* (1909) and *Ancient and Modern Imperialism* (1910).

Cromlech, see Stone Age.

Crompton, Samuel (1753-1824) English inventor of the spinning mule (c. 1779) was himself a spinner. He

opened a factory which failed and all he received for his epoch making invention was some £50 until in 1812 he was granted £5000 by Parliament. With this he built up a new business as bleacher spinner and merchant but was again unsuccessful.

Cromwell, Oliver (1599-1658) Lord Protector of the Commonwealth of England. Son of a Huntingdon farmer related to Thomas Cromwell minister of Henry VIII. Cousin of John Hampden. Elected M.P. for Huntingdon 1628 and for Cambridge 1640. Cromwell strove to destroy episcopal power and promoted the raising of forces for Parliament against the King. He commanded



Oliver Cromwell II

the cavalry under Essex at Edgehill 1642 and as colonel 1643 organised his Ironsides. With Fairfax, he commanded the cavalry under the Earl of Manchester defeating the Royalists at Winnebby and recovering Lincoln. His next victory was at Marston Moor 1644. Disputes between Cromwell's party and Manchester and the Scottish Presbyterians enabled the King to reach Oxford. The New Model army however was organised 1645 with Cromwell as lieutenant general. At Naseby 1645 Charles and Rupert were routed and Cromwell spent a year reducing strongholds till Oxford surrendered 1646. In the quarrel between the Army and Parliament 1647 Cromwell sided with the Army. As head of the Army Council he offered terms to Charles but following the King's flight to Carisbrooke he forced Parliament to cease all negotiations. In the second Civil War Cromwell defeated the Royalists at Preston 1648 and joined the In-

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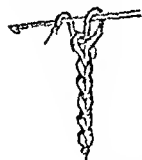


FIG 1

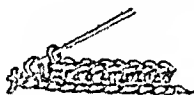


FIG 2



FIG 3



FIG 4

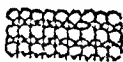


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World War. There are local fisheries out the holiday traffic and naval work give most employment. Pop 1500.

Crome, John (1768-1811) English landscape painter was the son of a poor Norwich weaver and was apprenticed as a boy to a house painter. For relaxation he painted signboards and made sketches until a friend obtained for him a post as drawing master. He was the real founder of the Norwich school of painting and became President of the Norwich Society of Artists on its foundation in 1805. Although he first exhibited in the Academy in 1808 his work was shown mainly in his native town most of it consisting of paintings of the surrounding countryside. Examples may be studied at the National Gallery, London where his *Household Heath near Norwich* shows at its best his faithful adherence to nature. His water-colours of Norfolk scenes have definitely established his reputation as one of the finest English landscape painters. His etchings have the same quality. He is generally known as 'Old Crome' in order to distinguish him from his son John Bernay Crome (1794-1841) his assistant also a landscape painter of considerable merit, who is represented at the Tate.

Cromer Evelyn Baring 1st Earl of (1841-1917) British statesman Secretary to the Viceroy of India (1872-6) as commissioner of the Egyptian Public Debt (1877-9) and Controller General he reorganised the finances of the State. Acted as Agent and Consul General in Egypt (1883-1907) furthering Egyptian education irrigation etc. Through his efforts together with Kitchener's victory at Omdurman (1898) the Sudan was restored to Egypt and Britain. Chairman of Dardanelles Inquiry Commission 1916. Author of *Modern Egypt* (1908) and *Ancient and Modern Imperialism* (1910).

Cromlech, see STONE AGE.

Crompton, Samuel (1753-1817) English inventor of the spinning mule (c. 1779) was himself a spinner. He

opened a factory which failed and all he received for his epoch making invention was some £50 until in 1810 he was granted £5000 by Parliament. With this he built up a new business as bleacher spinner and merchant but was again unsuccessful.

Cromwell, Oliver (1599-1659) Lord Protector of the Commonwealth of England. Son of a Huntingdon farmer related to Thomas Cromwell minister of Henry VIII. Cousin of John Hampden. Elected M.P. for Huntingdon.

1629 and for Cambridge 1640. Cromwell strove to destroy episcopal power and promoted the raising of forces for Parliament against the King. He commanded

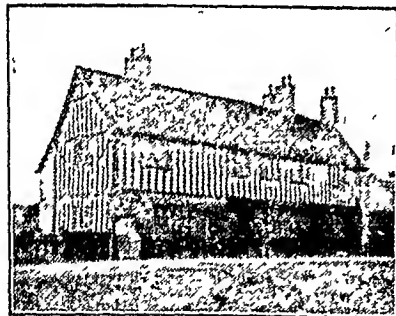


Oliver Cromwell.

the cavalry under Essex at Edgehill, 1642 and as colonel 1643 organised his Ironsides. With Fairfax, he commanded the cavalry under the Earl of Manchester defeating the Royalists at Marston and recovering Lincoln. His next victory was at Marston Moor 1644. Disputes between Cromwell's party and Manchester and the Scottish Presbyterians enabled the King to reach Oxford. The New Model army however was organised 1645 with Cromwell as lieutenant general. At Naseby 1645 Charles and Rupert were routed and Cromwell spent a year reducing strongholds till Oxford surrendered 1646. In the quarrel between the Army and Parliament 1647 Cromwell sided with the Army. As head of the Army Council he offered terms to Charles but following the King's flight to Carisbrooke he forced Parliament to cease all negotiations. In the second Civil War Cromwell defeated the Royalists at Preston 1648 and joined the In

dependents in driving out the Presbyterian majority from Parliament (Pride's Purge). Controlling Parliament and the Army, Cromwell now brought the King to trial. After the latter's execution, Cromwell, having reorganised the Army and Navy, crossed to Ireland, subdued Drogheda, Wexford, and the sea-coast (1649-50), Charles II, proclaimed king, opened his campaign in Scotland with Leslie, 1650. But Cromwell defeated Leslie at Dunbar, and Charles at Worcester, 1651, thus ending the Civil Wars.

Hampered by the Long Parliament, Cromwell dismissed it, 1652, but the succeeding "Barebones Parliament" was a failure, and he ruled as a dic-



Oliver Cromwell's House, Ely

tator. A Council of State was now formed, with Cromwell as Lord Protector (Dec 1653). Peace was made with Holland, 1654, and Cromwell strove to carry out reforms in the Church, law, morals, and education. With Blake, he built up the Navy. Jamaica was captured from the Spanish, 1656, and Dunkirk, 1658. But his foreign policy on behalf of Protestantism in Europe was a failure. Yet England's prestige was at its height, and in 1657 Parliament petitioned Cromwell to become King. The army's opposition, however, led him to refuse the title. Peace with Spain was in sight when Cromwell died, at the height of his power, 1658.

A vivid picture of Cromwell is given in Scott's *Woodstock*.

Cromwell, Richard (1626-1712), Lord Protector of England. Served under his father, Oliver Cromwell, in the Parliamentary Army, was M.P. 1654-6, but lived most of his time in the country. He was quite unprepared for office when he succeeded to the protectorate, 1658, and the Army forced his resignation, 1659. After the Restoration he left for the Continent; he returned to England, 1680, and died at Cheshunt.

Cromwell, Thomas (c 1485-1510), Earl of Essex, English administrator was Wolsey's agent in the dissolution of the smaller monasteries, 1525. As secretary and chief minister to Henry VIII, he directed the divorce proceedings against Catherine of Aragon. Aiming at absolute power for the King, he promoted the Act of Supremacy, 1534, and the Acts of Reformation against the Church, 1532-9. Raised revenue by suppressing monasteries, 1535. Created Earl of Essex, 1540. He negotiated Henry's marriage with Anne of Cleves, and soon afterwards was charged with treason, and executed.

Cronin, A. J. (b 1896), doctor and novelist. He leaped into fame with *Hatter's Castle* in 1931, this being followed by *Three Loves* (1932) and *Grand Canary* (1933).

Cronje, Piet Arnoldus (1840-1911), Boer general. Led the Transvaal insurrection, 1880, and besieged Potchefstroom in the first Boer War, 1881. He forced the Jameson raiders to surrender, 1890, and in the second Boer War besieged Kimberley, and repulsed the British at Magersfontein, 1890. Captured at Paardeburg, 1900, he was sent as a prisoner to St Helena.

Cronos [KRONOS'], in Greek mythology, son of Uranus (Heaven) and Ge (Earth). He became ruler of his Titan brothers. By Rhea (Cybele) he had six children, of whom Zeus (Jupiter) alone survived, for Cronos swallowed the other five (Pluto, Neptune, Vesta, Ceres, and Juno) to avoid being dethroned by them. Jupiter ultimately

overthrew him and caused him to disgorge the five gods and goddesses. With the aid of the Cyclopes they finally after an age long war defeated Cronos and the Titans and cast them down into Tartarus.

Crookes Sir William (1832-1919) English physicist. He made many discoveries in physics and chemistry including that of thallium (qv) 1861 and of new elements in gadolinite (qv). He is famous for his postulation of a fourth state of matter as a result of his researches on the discharge of electricity through highly rarefied gases. He invented the spinthariscopes (1908) the Crookes Tube a gas filled ray tube etc. Crookes was knighted in 1897 and appointed to the Order of Merit in 1910. See also AROM ISOTOPES.

Crops. The principal crops of Great Britain and Ireland in 1899 and 1931 were as shown on page 944.

Croquet (Fr. *Croc* = crook) a



Diagram 1 Croquet Ground.

lawn game introduced into England c 1850 in which 4 balls—blue red black and yellow always played in that order—are struck with wooden mallets through 6 hoops and against one peg

in a prescribed order as shown in the diagram. Formerly two pegs were used. The All England Croquet Club Wimbledon was formed in 1868 and the first open meeting held in the same year.

After c 1880 the popularity of croquet suffered severely owing to the spread of lawn tennis but it revived when an improved form of the game was introduced c 1894. The *Croquet Association* was formed in 1896 with its headquarters at Rochampton.

A *croquet ground* should be 30 yds long by 28 yds wide. The balls are made of boxwood or composition 3½ in in diameter and 15-16½ oz in weight. The mallets may be of any size or weight. The hoops are 1 in high and 3½-4 in wide (inside measurement).

The game may be played by 2 or 4 players. 2 players using 2 balls each. 4 players 1 ball each. Each player in turn starts from baulk an area 3 ft wide along the boundary behind the 1st hoop and continues until he fails to make a point i.e. pass through a hoop or strike a peg in the correct order or to strike (roquet) another ball in play with his own. He then takes croquet by placing his own ball in contact with the roqueted ball and strikes it with his mallet in such a way that both balls are moved after which he is entitled to another turn.

The progress of each ball is marked by a clip of corresponding colour attached to the hoop or peg which has to be taken next. When a ball has passed through the last hoop it is called a *rover*. On striking the final peg the rover is out of the game. Formerly the player was then reduced to one turn with the remaining ball and it was therefore not advisable to let one ball become a rover before the other had nearly reached the same point. Now however two turns are permitted with the remaining ball.

Croquettes (CROKETS) a savoury mixture of meat fowl fish cheese nut egg etc bound together with a sauce then coated with egg and breadcrumbs and fried.

Crop	Acreage		Produce (tons)	
	1929	1931	1929	1931
Wheat	6,051,567	6,359,151	1,365,000	1,634,000
Barley			1,229,000	954,000
Oats			3,253,000	2,698,000
Potatoes			8,871,000	5,781,000
Turnips			10,433,000	16,222,000
Mangolds	3,870,273	3,695,318	7,493,000	6,101,000
Hay	3,869,214	4,115,641	12,185,000	11,935,000

WORLD CEREAL CROPS (1931)

Million quarters

Crop	U S S R	U S A	British Empire	Total
Wheat	120	111	112	549
Maize	20	295	20	480
Oats	110	111	59	421
Rye	100	4	—	183
Barley	35	21	28	177

OTHER CROPS

Thousand tons

Crop	Principal Producing Countries		Total
Beet Sugar	U S S R	1,500	8,750
	Germany	1,600	
	U S A	1,100	
Cane Sugar	British India	3,900	17,600
	Cuba	2,750	
	Dutch E. Indies	2,450	
Cocoa	Gold Coast	220	520
Coffee	Brazil	780	1,500
	Columbia	185	
Cotton	U S A	3,600	5,900
	China	900	
	India	720	
Linseed	Argentina	2,150	3,900
	U S S R	725	
Potatoes	U S S R	51,000	200,000
	Germany	41,000	
	Poland	31,000	
Rice	India	51,000	130,000
	China	45,000	
	Japan	16,600	
Rubber	Malaya	455	800
	Dutch E. Indies	260	
Soya Beans	Manchuria	5,200	7,000
Tea	China	400	810
	India	177	
	Ceylon	110	
Tobacco	U S A	730	2,300
	India	630	
	U S S R	135	

Shrimp croquettes

1 oz margarine
1 oz flour
½ pint fish stock or milk
6 oz peeled shrimps
Anchovy essence
Egg and breadcrumbs

Make a sauce by adding flour to melted margarine and gradually pouring on the milk. Cook for a few minutes. Add a little anchovy essence, shrimps and seasoning. Spread out on a plate to cool, when cold cut into 8 or 10 pieces and form into cork shapes, coat with egg and bread crumbs. Fry in deep fat and drain.

Cross (Hindu *Karor*) 100 lakh or 10 millions of rupees written Rs. 1,00,00,000 and worth Rs. 667 at par.

Cross, adopted as the symbol of the Christian religion in commemoration of the death of Jesus Christ by crucifixion. It was not officially used here until the time of the Emperor



High Cross Mon at Abbe Louth I.P.S.

Constantine Crosses of various kinds were used for ornamentation in earliest historic times, including the tau cross and the crux ansata. The latter, the Maltese cross and the cross patée are frequently employed in heraldry. The Eastern Orthodox Church uses a cross with two horizontal bars. The Celtic cross with a circle round the top is found frequently in Ireland and Scotland, often elaborately carved.

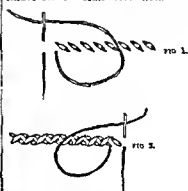
Crossbill, a bird akin to the finches (*q.v.*) distinguished by the tips of the upper and lower beak being elongated and crossed, thus providing an implement suitable for extracting the seeds of the fir-cone. Various species occur in Europe, Asia and America.

Crossbow, a weapon projecting an arrow or bolt by means of a heavy bow mounted on a stock similar to that of a musket. The bow was rendered taut by a lever or mechanical winding apparatus. The crossbow was most commonly used in the 11th and 13th cents, though a heavier form continued in use much longer and developed into the artillery (*q.v.*)

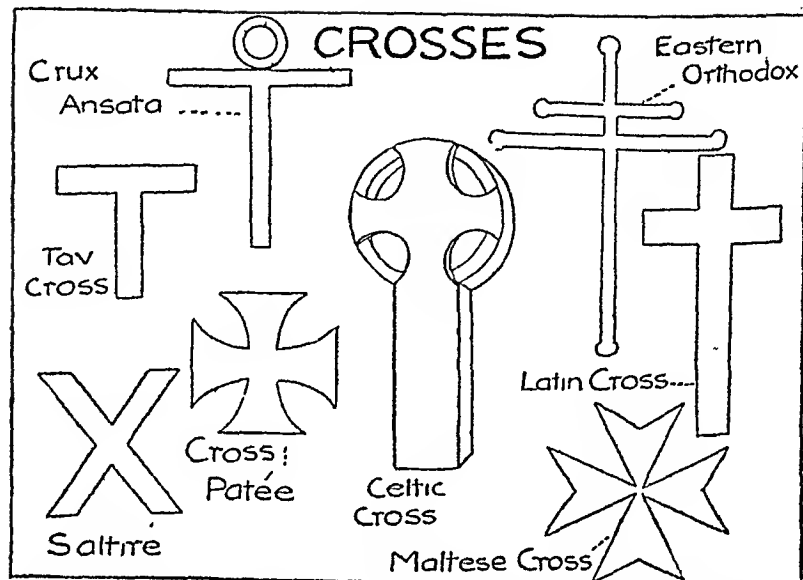
Cross breeding see **CATTLE**

Cross, see **LACROSSE**

Cross-stitch, a simple embroidery stitch worked on linen or canvas or as a background used in the tapestry emblems. Half-cross stitch is the



Cross-stitch.



name given to the stitch half finished (Fig 1), and gives a thinner and lighter surface to the design than the full cross-stitch (Fig 2)

Crossword, a popular form of puzzle usually comprising a square or rectangle divided by horizontal and vertical lines into small squares. A common form is the square with 15 small squares on each of its sides, or 225 small squares altogether. Each of the small squares, when not filled up or cancelled with a "stop," must ultimately contain a letter of the alphabet, forming part of a word. Most of these letters form part of two different words, one running across, the other downwards. The beginning of each word in the diagram is numbered, the number corresponding with that of the appropriate "clue." Attached to the puzzle is a set of "clues," from which the solver has to deduce the words. In some forms of crossword puzzle the end of a word is marked by a bar, in others by a cancelled square or "stop." These

"stops" are usually arranged symmetrically. The crossword differs from the word-square in that the latter has no "stops."

Croton Oil, a fatty oil obtained from the seeds of *Croton tiglium*. It is an extremely powerful cathartic, for which purpose it is used medicinally. It is also a strong vesicant. The characteristics of the oil are given in the article OILS, FATS, AND WAXES.

Group, an acute form of non-infectious laryngitis occurring most frequently in children. It is characterised by great difficulty in breathing, a metallic cough and blueness of the face, but these symptoms may be spasmodic and recurring several times a day. In extreme cases the mucous membrane may become so swollen that death occurs from asphyxia, and to prevent this tracheotomy may have to be resorted to. In milder cases the child may be placed in a warm bath and sponged with cold water. Ipecacuanha wine

may be given to start respiration and the child should be put to bed in a room containing a steam kettle

Crow general name for a family of birds found throughout the world and represented in Britain by the carrion crow hooded crow raven rook jackdaw magpie jay and chough

In this country rooks (*g v*) are often called crows but the latter term is generally restricted to the two first mentioned species which apparently differ only in colour and distribution the carrion crow being all black and more S in its range the hooded crow black and dark grey and on the whole more N Both however are more or less migratory moving S in winter and where their ranges cross they not infrequently interbreed

Crows are omnivorous but mostly feed on animal matter eating eggs worms small birds and mammals carrion etc They nest in tall trees and are very wary The carrion crow

is distinguished from the rook by its straighter bill which is also feathered not naked at the base its duller black colour and its more solitary habits It is usually seen alone or in pairs



Crow

Crowe, Sir Eyre (1861-1955) British administrator represented Britain at The Hague Conference 1907 His scheme for the seizure of German shipping was adopted in the World War Served on the British committee which drew up a draft convention of the League of Nations and was at the Paris Peace Conference Became Permanent Under Secretary for Foreign Affairs 1920

Crowfoot, white flowered aquatic plants belonging to the same genus (*Ranunculus*) as the buttercup

Crow Indians, see RED INDIANS

Crowland (or Croyland) a market town in Lincolnshire situated on the R Well and 8 m N of Peterborough An abbey was founded here in the 8th cent but was partially



W. Crowfoot.

destroyed by the Danes in 80 It was rebuilt in 948 after which it was twice burned down and twice rebuilt The N aisle of the Norman abbey church is now used as a parish church The town possesses a curious triangular 14th-cent Gothic bridge for foot passengers Pop (1931) 809

Crown, ancient headdress associated for thousands of years with royalty and in ancient times with persons distinguished in war athletics etc in the former capacity it was worn by the Jewish and Egyptian Kings and in the latter by the Greeks and Romans who awarded various kinds of crowns in recognition of various services to the State e.g. the *corona navalis* ornamented with representations of prows of ships was awarded to a naval victor the *corona civica* made of oak leaves and acorns to a soldier who had saved a Roman's life The victor in a contest in the Olympic Games was awarded a crown of wild olives

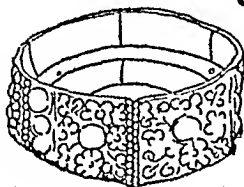
The modern crown probably evolved from the Oriental diadem which was simply a band of silk or other material

The crown of the early English kings no longer exists, but from paintings its development from the more or less plain circlet of Danish and Norman times can be traced. The old crown of St Edward, with which the kings were covered, was destroyed after the Civil War, but the new one, made for Charles II, now known as St Edward's crown, was designed after the same pattern, and is used at coronation ceremonies. The later British crowns consist of the Imperial State crown

The crown of Charlemagne is decorated with Byzantine enamels representing scriptural subjects, while the Hungarian crown of St. Stephen, besides being lavishly jewelled, has enamels representing the figure of Christ, with those of archangels and saints. See also CORONET.

Crown, name applied to coins, of varying value in different countries, the English crown being of silver and equivalent to 5s. The word was first used in this connection for the golden

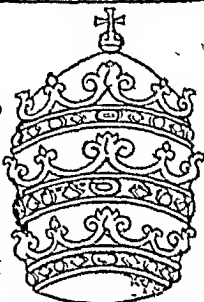
CROWNS



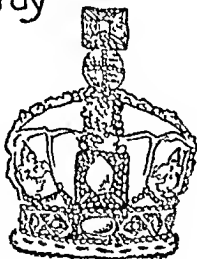
Iron Crown of Lombardy



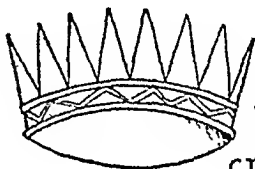
duke's coronet



Papal Tiara



crown of Edward VII



stellate crown

made in 1838 for Queen Victoria, the Imperial crown of India made for the coronation of George V as Emperor of India, the State crown of Queen Mary, containing the Koh-i-noor diamond, and the crown and diadem made for the consort of James II (see CROWN JEWELS). The crown of Scotland, which is in Edinburgh Castle, is older than any of the above, dating in its original state from the 14th cent. The papal tiara takes the form of a hat shaped like a nutre which is surrounded by three crowns, one above the other

couronne of Philip of Valois in the 14th cent. Henry VIII struck the first English crown, in gold, while Edward VI introduced alternative silver crowns and half-crowns, which only entirely superseded gold in the reign of James II. The mintage of crowns was abandoned from 1861 to 1887, and is now done to a very limited extent only. The Danish, Swedish, and Norwegian crowns are worth 1s. 3d. at par.

Crown Colonies, see BRITISH EMPIRE.
Crowne, John (1640?-1703), English playwright of the Restoration period,

wrote among other plays *The Country Wit* (1608) *Sir Colly Cibber* (1694) *The Married Beau* (1694) and *Cathula* (1698). They show no remarkable talent but were very popular with the Court of Charles II.

Crown Filles, see CULLUSSE

Crown Jewels, jewelled emblems of royalty. Those of Great Britain are on view in the Tower of London. The *Imperial State Crown* designed and made in 1839 for Queen Victoria contains among its many gems one of the *Star of Africa* diamonds weighing over 300 carats. The biggest *Star of Africa* is in the King's sceptre and weighs 816½ carats. The State crown also contains the enormous *Black Prince* ruby, once the property of the Black Prince, the Stuart sapphire taken from Charles II's crown, the sapphire which Edward the Confessor wore in his Coronation ring, and many other famous gems of fabulous value. The *Imperial Crown* was made for King George V for his coronation as King Emperor at Delhi in 1911. By law the King's crown may not leave the country so a new crown had to be made. Though not so magnificent as the State crown, most gorgeous and valuable of all crowns, the Imperial crown is a beautiful and elegantly designed piece of work. The *St Edward's Crown* worn by the King at his coronation was first used by Charles II. A feature is the two complete arches studded with pearls which intersect and are surmounted by a gold mound and jewelled cross. The *State Crown* of Queen Mary is remarkable for its famous *Koh-i-Noor* diamond weighing 106 carats besides another part of the *Star of Africa*. The Queen's other two crowns are the *Crown* and the *Diadem* of Queen Mary of Modena. The latter is one of the costliest crowns in the world. The King and the Queen have each three sceptres. The rest of the State regalia consists of the two orbs, the anointing spoon for use at Coronations, five swords including the two-handed sword of State and the

famous jewelled sword used at the Coronation, the golden Spurs of St George which also have a symbolic meaning at the Coronation, the Bracelets, Dove and Ampulla.

One of the most famous and elaborate regalias in the world was the property of the Russian royal family in pre-revolutionary days. The Emperor's Crown blazed with diamonds and rubies and was surmounted by an enormous uncut ruby. This crown of fabulous worth was first worn by Tsar Paul I. One of the Russian crowns was sold by auction in London in 1917. The beautiful and brilliant Viennese crown jewels are among the most impressive of great regalias while Italy treasures the ancient and historic Iron Crown of Lombardy whose inner band is said to have been a nail from the True Cross. At the Louvre in Paris may be seen Charlemagne's sword and spurs and other royal jewels once in the keeping of the Bourbons and Napoleon.

Crown Lands, in the United Kingdom lands belonging to the sovereign, the revenues from which he now surrenders at the beginning of his reign in return for the Civil List (q.v.). They are managed by the Commissioners of Woods, Forests and Land Revenues. In the year 1930-31 the total receipts from the lands amounted to £183,938 and the expenditure to £55,657.

Croydon county borough Surrey, England. The palace of the Arch-



Croydon. A road from Croydon looking N.E.

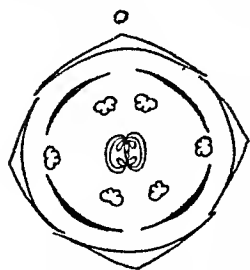
bishops of Canterbury—now used as a girls' school—dates from the 13th cent., and the parish church from c. the 10th cent. It was rebuilt in the 14th cent. and again after the fire of 1867. The Whitgift Hospital was founded in 1596, and the Grammar School (also endowed by Archbishop Whitgift) moved into new buildings in 1871, and again, in 1930, to a site outside the town. Croydon is largely residential, being in effect a suburb of Greater London.

The London Terminal Aerodrome, Croydon, occupies an area of 400 acres, and is one of the busiest air-ports in the world. Pop (1931) 233,115.

Crozier, the bishop's staff of office. It resembles a shepherd's crook in shape, and may have developed from the hooked staff carried by the Roman augurs (*qv*). An archbishop carries, in place of a crozier, a staff terminating in a cross, and a patriarch in the Eastern Church a cross with two transverse bars, the Pope's staff is a cross with three transverse bars.

Cruciferae, a large and important order of plants readily distinguished by the flowers, which have four sepals, four petals, placed crosswise (hence the name of the family), and six stamens, four long lines and two short, and a characteristic many-seeded fruit, formed of two joined carpels which,

when ripe, split away from each other from the base upwards to eject the seeds. The family includes the cabbage, cauliflower, broccoli, kale, turnip, mustard,



Cruciferae (Floral Diagram)

crucifer, and radish. Among cruciferous garden plants are the wallflower, stock, honesty, and alyssum. Many common weeds belong to the family, including shepherd's purse.

Cruden, Alexander (1701–1770), English biblical scholar, is best known as the author of the *Complete Concordance of the Holy Scriptures* (1737). He suffered from periods of insanity, and, under the name of "Alexander the Corrector," wrote pamphlets censuring the morals of his time.

Cruikshank, George (1792–1878), English caricaturist and illustrator. His father was a painter, and he was born in London, where he gained early popularity with his etchings, and where he was destined to become the foremost caricaturist and illustrator of his time. He had great technical dexterity and amazing fertility of invention. His political cartoons, drawn for such periodicals as *Town-Talk* and *The Satirist*, throw an interesting sidelight on the political ideas and public life of his time, he himself apparently remaining aloof from all parties and castigating each impartially. The question of temperance, however, was one which engaged his personal feeling, and the lurid woodcuts which accompanied his pamphlets, *The Bottle*, in 1847, and *The Drunkard's Children*, in 1848, might be expected to alarm, if not to reform, any alcoholic addict. Cruikshank's illustrations to Grimm, to *Oliver Twist*, and the *Ingoldsby Legends* are worthy of special mention among the huge volume of such work that he produced. He painted in water-colours and in oils. The National Gallery possesses his *Worship of Bacchus*, another of his pleas for temperance.

Cruiser (KRÖÖZÜ), a fast warship, designed and armed for patrolling sea-routes and for scouting. The use of convoys in the 17th-cent. Dutch wars, and the activities of Mediterranean pirates necessitated a faster, more mobile and heavily-armed vessel than the ordinary line-ship. The 700-ton frigate with 28 to 32 guns was the result, and by the middle of the 18th cent. this type was well established. The introduction of iron ships and steam power resulted in the design of the cruiser class.

The first modern type known as the protected cruiser was developed in the 1890s and combined fast steaming capacity with effective armament. From 7000 tons this class gradually grew to 15000 tons by 1908 the *Minotaur* built in that year carrying four 9.2 in guns and 10 of 7.5 in. The protected type gave place to the heavy armoured cruiser between 1900 and 1914. Its slowness caused its failure in the World War and it was replaced by the battle-cruiser with an armament almost as heavy as that of a

since been used on trade routes and in the Far East. The limitation of cruiser size to 10000 tons by the Washington Treaty of 1919 paradoxically caused the building of more of these larger vessels in place of the hitherto popular light cruisers.

CROSS 88 TR FIVE N AL POW 83
December 21 1934

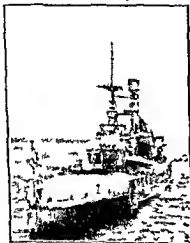
	B II		B Mung	
	N	Ton	N	Tons
British Empire	43	97 706	10	80 000
U.S.A.	19	153 300	9	90 300
J.P.	29	189 9 5	4	34 30
France	11	94 016	8	5 806
Italy	9	69 584	8	54 002

T A AG MT T Lo
T RA V (1930)

	Cruiser over 6- ins	Cruisers 6-12 ins	Val in m 194 on L 1957-8
	T in Tonnage	T in Tonnage	
British Empire	148 800	199 07	87 220
U.S.A.	180 000	243 300	76 000
J.P.	208 430	200 450	—

Cruising a form of pleasure voyage at sea undertaken by a well-appointed liner or other suitable vessel. In the 80s and 90s yachts were often chartered for cruising, chiefly in the Mediterranean and this pleasant form of holiday was occasionally made available to the public by shipping firms. After the World War the large surplus of liner tonnage demanded some new use. Liners were reconditioned fitted with sports decks swimming baths and other amenities and run on pleasure cruises of varying duration. The depreciation of the currency in 1931 and the patriotic campaign to spend money only on British enterprise dissuaded large numbers of people from taking their holidays abroad and gave an impetus to British cruising.

Certain private societies organise



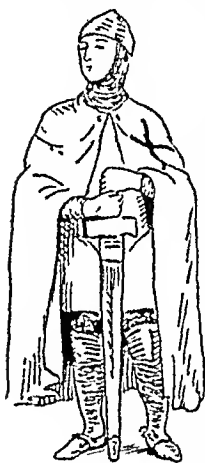
H.M.S. Renown

battleship and a speed second only to that of a destroyer. Although these cruisers were primarily designed for enveloping tactics and for harassing the enemy's rear they did in fact take part in many straight artillery actions. The *Queen Mary* with eight 13.5 in guns and a displacement of 27500 tons reached a speed of 28 knots.

Parallel with the development of battle-cruisers was that of light cruisers. These ships of between 3500 and 5000 tonnage and armed with 6-in guns were built in large numbers between 1914 and 1918 and have

cruises for special objects, such as archaeology, nature study, etc

Crusades, military expeditions in the Middle Ages to the Holy Land, originally sanctioned by the Church. Their object was twofold—to ensure the safety of pilgrims to Jerusalem, and to recover the Holy Land for Christendom. They were generally undertaken jointly by the Christian rulers of W Europe, though in a few cases they were led by a prince acting on his own initiative, or even by a commoner fired with religious enthusiasm. In one



A Crusader

case (the Sixth Crusade), the expedition was undertaken in defiance of the Church. In view of their professedly religious object the crusades differed from ordinary wars, and since their aim was forcibly to displace and not peacefully to convert the infidel, they were distinct from missionary movements. Their most

active period was from the end of the 11th to the end of the 13th cents. The more prominent crusades are usually distinguished by numbers (First, Second, Third Crusade, etc.) in spite of the fact that during the first period there were almost continuous expeditions from the West. At first the goal was naturally Jerusalem, but afterwards the crusaders were diverted to Egypt or to Constantinople, particularly in the later days of the E Empire.

When the Roman Empire was divided, the Holy Land became part of the territory of the E or Byzantine Empire, a fact that was to have

important consequences for the crusades. Less than 300 years after Constantine had founded his new capital on the Bosphorus, Jerusalem was lost. In A.D. 614 it was taken by the Persians under Chosroes; in 627 it was recaptured by the emperor Heraclius, only to be lost again in 637 to the Caliph Omar. From that date till 1018 the historic cradle of Christianity remained in possession of the Moslems.

The alien ownership of the Holy Land stimulated rather than discouraged the flow of pilgrims, and at first the new rulers of Palestine put no difficulties in their way. Indeed, the Arab conquerors, realising the peculiar esteem in which the Holy City was held by Christians, not only tolerated a Latin Church in their midst, but even allowed a kind of Christian protectorate. In 807 Harun Al Rashid acknowledged Charlemagne, the new W emperor, as patron of the Holy Places in Jerusalem, and for 200 years there was a kind of religious "entente" between East and West, exemplified by the contributions sent to Jerusalem by Alfred the Great and by Louis of Germany. In 1010, however, the Caliph Hakim II rudely terminated this arrangement. He destroyed the Church of the Holy Sepulchre, and transferred the patronage of the Holy Places to Constantinople. Thus the E Empire regained some of its influence over part of its lost territory. W Europe was naturally affronted, and the antagonism between the Greek and Latin Churches, aggravated by disputes over the new Byzantine regulation of pilgrim traffic, reached a head when the Great Schism of 1054 finally severed the two communities. But the differences between the Byzantine Empire and W Europe were submerged in the new danger from Asia. In 1071 the Saracens were overcome by the Seljuk Turks, whose attitude to pilgrims was definitely hostile. The same year the Seljuks under Alp Arslan routed the E emperor Romanus Diogenes at Manzikert, with the result that practically the whole of

Asia Minor fell into their hands. The question of the safety of Christian pilgrims was now linked up with the fate of a Christian empire. Constantinople sent an appeal to Rome, hoping that the West would swallow its resentment over minor matters and rise to meet the common peril. If the Western Powers left the E. Empire to its fate, their turn would come next. The first (abortive) appeal was made in 1073 when Michael VII asked Pope Gregory VII for help. In 1095 Alexius Comnenus who was fighting the Normans on the W. the Petchenegs on the N. and the Seljuk Turks on the E. (see BYZANTINE EMPIRE) appealed to Urban II for help against the Turks. The Pope responded in a great sermon at Clermont in France and the result was the First Crusade. The appeal of Alexius was answered but in a manner which immediately embarrassed and was later to disintegrate the E. Empire. Vast hordes of undisciplined adventurers poured into the Byzantine dominions, their religious enthusiasm not unmingled with temporal considerations. The Byzantine emperor had asked for reinforcements; he received an invasion. All he wanted was the help of the crusaders in his attempt to recover Asia Minor; the crusaders once they were under weigh thought very little about rehabilitating the E. Empire; they even subordinated the idea of making Palestine safe for pilgrimage to the grandiose plan of a Christian kingdom of Jerusalem.

The moving spirit of the early crusades was the Church, which dreamed of a universal religion with Jerusalem as its natural centre. But the Church did not invent the crusades; she regulated them. A cynic would applaud and a philosopher discount the policy which directed the activities of exuberant soldiers into a channel that would benefit them in both worlds. The crusaders would combine the ethical advantage of a penitential pilgrimage with the opportunity of sordid gain; to say nothing of the joy of adventure. The authorities at home

would be rid of individuals whose room was sometimes preferable to their company. Further, since in the Middle Ages in other ages trade followed the flag, the astute merchants of Venice, Genoa and Pisa were fully alive to the possibilities of the gain to be extracted from this new movement, whether in supplying the material wants of the armies or in transporting them across the Mediterranean. Still it must not be forgotten that in the Middle Ages religious zeal was intense and that the vigour of the crusades cannot be attributed to base motives alone.

The First Crusade was due to set out in Aug. 1096 and to assemble at Constantinople. Its leader was Adhemar, Bishop of Puy. But some months before an advance army, led by Peter the Hermit, Walter the Penniless and others had blazed the trail. Some of its divisions failed to reach Constantinople; those of Peter and Walter gained the rendezvous only to be annihilated by the Seljuks. The First Crusade proper, led by Godfrey of Bouillon (with his brother Eustace) by Raymond of Toulouse (with Bishop Adhemar, the titular leader) and by Bohemund of Otranto (with his nephew Tancred) and reinforced by other divisions assembled at Constantinople in May 1097. The Byzantine emperor, regarding the Holy Land as part of his lost territory and ceding these formidable chieftains to pay him homage. The crusading army invaded Asia Minor and after having taken Nicea with the help of Alexius, marched on. In 1098 they captured Antioch after a long siege. Principalties were created at Antioch by Bohemund and at Edessa by Baldwin. Raymond subsequently establishing the county of Tripoli. Godfrey of Bouillon led the assault on Jerusalem which fell in July 1099. Godfrey became the first ruler or Advocate of the Holy Sepulchre. On his death in 1100 Baldwin was elected first King of Jerusalem. About the same time Bohemund was captured in a foray with the enemy and the

palty of Antioch declined Another crusade, setting out in 1100, to rescue Bohemund and complete the discomfiture of the Turks, met with disaster But the new kingdom of Jerusalem, aided by the Genoese and Venetians, as well as by an unexpected reinforcement from Norway, began to expand The principalities of Antioch, Edessa, and Tripoli soon became dependencies, and by the death in 1131 of Baldwin II, nephew of the first king, the kingdom had reached its greatest extent In the N it marched with the county of Tripoli, and in the S it extended to the Red Sea Shortly after its establishment the order of the Knights Templars (*qv*) was founded to protect the crowds of pilgrims who now flocked to the Holy Sepulchre About the same time the order of the Hospitallers (*qv*) was instituted

But the Moslems were by no means inactive, and the tide turned with the fall of Edessa in 1144 This disaster called forth the *Second Crusade*, led by Louis VII of France and Conrad III of Germany The new Crusade, inspired by St Bernard, started favourably in 1145, but, owing to disputes and consequent lack of cohesion between the allies, it ended in ignominious failure As a result, the Kings of Jerusalem began to look for support to the E Empire, and the kingdom temporarily became an appanage of Constantinople The Moslems were now bent on surrounding the Latin kingdom, and we find in 1164 Nureddin and Amalric I of Jerusalem fighting in Egypt, the one to complete, the other to escape, the Mohammedan encirclement In 1171 Saladin became ruler of Egypt, and Jerusalem was at last surrounded by a united body of Sunnite Moslems At this juncture the crown of Jerusalem was offered to Henry II of England and to Philip Augustus of France, but neither would accept Saladin proclaimed a Holy War, and the Crusaders found themselves the object of religious attack Saladin took Damascus in 1174 and Aleppo in 1183, in 1187, after defeating the Christians

at Tiberias in May, he routed them once more at Hattin in July, with the result that Jerusalem fell in Oct With the exception of Tyre and the N dependencies of Tripoli and Antioch, the Latin kingdom lost all its territory until the Sixth Crusade, though the title of King of Jerusalem persisted for another hundred years

This catastrophe inspired the *Third Crusade*, which assumed a distinctly secular character It was led by the kings of England and of France (who both imposed taxes at home to pay for their levies), and by the German emperor They agreed to meet outside Acre, besieged since 1189 by Guy de Lusignan, titular King of Jerusalem Accident robbed the Germans of their emperor Frederick I Barbarossa, and only a remnant of their forces reached Acre The French contingent, under Philip Augustus, made its way direct to Acre, while Richard Cœur de Lion stopped on the way to conquer Cyprus In July 1191 Acre fell after a two years' siege, during which the Teutonic Order, the third of the great religious-military orders, came into being The French king departed, while Guy de Lusignan bought Cyprus from Richard, and founded a kingdom of his own The crown of Jerusalem passed in 1192 to Conrad of Montferrat, who had claimed it from Guy Conrad died the same year, and Henry of Champagne succeeded In Oct 1192 Richard, having conducted protracted and partially successful negotiations with Saladin, started on his return to Europe and captivity This crusade accomplished little, but it illustrated the changing character of the movement Religious objects were now becoming a cloak for worldly schemes, and diplomacy began to take the place of pontifical direction.

The *Fourth Crusade* was characterised by a mixture of motives Its original objective was Egypt, there having been since 1198 a truce between Amalric II of Jerusalem and Cyprus (1197-1205) and Malik-al-Adil I, the

brother and successor of Saladin. It was arranged for Venice to transport the crusading army by sea to the Egyptian coast. But a series of events diverted it to Constantinople. The emperor Isaac Angelus had been dethroned by his brother Alexius III and he induced the Crusaders to effect his reinstatement. Once restored however he was unable to fulfil the promises he had made to his rescuers with the result that they stormed Constantinople in 104 and established the Latin empire of Romania (see *BYZANTINE EMPIRE*). There were several underlying causes for this Christian attack on a Christian empire which could not fail to be to the advantage of the infidel. The West had always been jealous of Byzantine pretensions ever since Hakim had transferred the religious patronage 90 years before. The Byzantine emperors had persistently regarded Palestine and Syria as right fully theirs and they had exacted homage from the Latin conquerors of the Holy Land exacted heavy dues from the pilgrims and generally hampered the course of the campaigns. Thus they excited the hostility of the West particularly of the Sicilian Normans and this hostility was kept alive by the greed of the Venetians who not satisfied with the concessions they had already extorted from Constantinople were on the look out for more. The Fourth Crusade all but destroyed the Byzantine Empire without appreciably affecting the situation in Palestine. Jerusalem remained unconquered but at peace. Malik-al Adil concluded a series of truces with the Christians between 1198 and 1217.

In 1212 the pathetic and ill-starred Children's Crusade led by a French boy called Stephen, embarked at Marseilles. From Germany another boy called Nicholas led a comparable expedition into Italy. Stephen's followers having suffered a series of maritime disasters were sold into slavery in Egypt but those of Nicholas

was dispersed before leaving Europe.

The *Fifth Crusade* (1218-21) under John of Brienne with Leopold VI Duke of Austria and Andrew II of Hungary was directed against Egypt. The crusaders captured Damietta (1219) but rashly rejecting the generous terms offered by the Sultan became involved in an unfavourable war and eventually withdrew without accomplishing any thing.

The *Sixth Crusade* (1228-9) one of the most successful in the history of the Crusades differed from all the others in that it was condemned rather than approved by the Pope. It was therefore strictly not a crusade at all. Its leader was the emperor Frederick II against whom while he was on his way to the East Gregory IX issued a ban of excommunication. The success of this crusade was achieved by diplomacy alone. In 1228 after Frederick's marriage to Isabella heiress of the Kingdom of Jerusalem he at once took for himself the title of King of Jerusalem. In 1228 he sailed to the Holy Land and the following year he concluded a ten years' treaty with the Sultan of Egypt which gave him Jerusalem and S. Palestine. The success however was not lasting. In 1238 the treaty came to an end and disaster followed despite the arrival of Theobald of Champagne and of Richard of Cornwall (son of King John of England). Jerusalem was finally lost in 1244 at the battle of Gaza and was not to be recovered by a Christian power till 1918 though titular kings of Jerusalem lasted till 1901.

The *Seventh Crusade* led by Louis IX of France (St. Louis) was like the fifth directed against Egypt. Again Damietta was taken but in the march on Cairo St. Louis was captured with his whole army after the battle of Mansourah in 1250. The same year the situation was worsened by the deposition of the Ayyub dynasty (to which Saladin had belonged) by the fanatical Mamluks. St. Louis after paying half his ransom of 800,000 pieces of gold and surrendering the

newly-won Damietta, went to Acre, but after four years' inactivity he returned to France. In response to his appeals to Europe there set out the curious Shepherd's Crusade, which bears some resemblance to the Children's Crusade of 1212. About this time the Mongols were extending their empire, and the crusaders, encouraged by the partial conversion of the Mongols and buoyed up with stories about Prester John, had vague ideas about an alliance with the mythical Khan. But the Mameluke campaign of reconquest proceeded, in 1268 they took Antioch, extinguishing the principality that had been founded by Bohemund in 1099.

In 1267 St Louis carried the cross to Tunis, where he died in 1270. Thereupon his brother Charles of Anjou, who had obtained the kingdom of the Two Sicilies, concluded an advantageous treaty with the Bey of Tunis and returned home. A member of this expedition, Prince Edward of England (afterwards Edward I), led an abortive crusade to Acre in 1271. Charles was planning a private crusade against Constantinople in 1282 when the rebellion of the Sicilian Vespers and his own death in 1285 prevented its fruition. The Mamelukes took Tripoli in 1289, and their capture of Acre in 1291 signalled the extinction of the kingdom of Jerusalem, and the real end of the Crusades, though the attempt of Peter of Cyprus, founder of the Order of the Sword, to reconquer the Holy Land in 1365-9 may be regarded as their echo. Finally, when the E. Empire was in deadly peril in the 15th cent., the Pope preached a Crusade for its rescue, and the ill-fated army of Hungarians and Poles which was routed at Varna in 1444 may be regarded as anachronous crusaders.

Though the Crusades ended in failure, they exerted a powerful influence on the progress of events in Europe and on cultural and political developments. The crusaders learnt much from the civilisation of the

Levant, the arts of war and peace were enriched by the new contact. Trade was generally stimulated, strange commodities, such as cotton and sugar, found their way into Europe. Geographical knowledge was greatly extended. The new commercial interests of Venice in the Levant may have been responsible for the trading journeys of Marco Polo to China in the 14th cent., and the missionary movement, set in motion by St Francis during the Fifth Crusade spread to the Mongol Empire. As an indirect result of the crusades, the "new world" of Asia was rediscovered.

Crushing and Grinding operations of, great importance in many industries, particularly mining, cement, and concrete, and chemical industry generally.

The subject falls into three divisions: (1) coarse crushing, (2) reduction to small lumps, (3) reduction to fine and excessively fine powder. The most efficient type of *coarse crusher* is that known as the *jaw-crusher* or *jaw-breaker*. It consists essentially of two strong jaws set at an angle, one being fixed, the other being moved by a powerful "toggle" action, operated by an eccentric on the shaft of a heavy fly-wheel. Both jaws are armed with manganese-steel or other exceedingly hard substances having corrugations on the face. The lumps of material to be crushed are thrown between the inclined faces of the jaws, as the one jaw moves outwards they slip down, and as it moves backwards they are nipped very powerfully at a few points. This causes brittle material to shatter with a minimum expenditure of energy. The *gyratory crusher* is based upon similar principles, but is more economical in its working. In this, the material is received into a cone, which can be imagined as the fixed jaw of a jaw-crusher carried right round the circle so as to enclose the movable jaw in a conical funnel. The movable jaw takes the form of another cone, solid in this case, within the first. This cone is oscillated

slightly on a circular movement of the lower end and thus approaches and recedes from each part of the outer cone in turns.

Further reduction in size is usually effected by *rolls* similar to the domestic wringer that is to say two rollers rotating close together between which the material is nipped and crushed. The action of the *disc crusher* is similar to the gyratory crusher but suited to finer material. The *size runner mill* is one of the oldest forms of crushing machine consisting of a horizontal circular trough or dish which is rotated by power. Two or more heavy wheels with their axes horizontal rest upon the dish and as this is turned round are caused to rotate. By their weight they crush whatever material is thrown into the dish.

For Grinding is now generally accomplished on a large scale by what are known as *ball and tube mills*. These consist of long horizontal cylinders or sometimes cones lined with very hard material and filled with heavy balls either of steel or quartz pebbles in which case they are sometimes called *pebble mills*. The whole is rotated the material being fed in at one end and the finely ground product flowing out at the other. The material usually requires to be conveyed into the mill by a worm but escapes freely at the other end. The faster it is fed the less finely it is ground. For very small scale and laboratory work this type of apparatus is frequently employed in the form of a hard stoneware pot half filled with quartz pebbles. The material to be ground is placed in this and it is rotated slowly on a horizontal axis for such time as is necessary to attain the desired fineness.

Centrifugal mills are worked at a much higher speed and depend upon crushing the material by the centrifugal force of large steel balls or rollers pressing against the side of a hard casing. This type of mill depends for its efficiency on the combination of this method of grinding with the continual

separation of the fine material produced a process usually accomplished by passing a current of air through the machine. For larger-scale grinding of flour and other material not suitable for centrifugal or ball mill the *roller mill* is used. This is similar again to the domestic wringing machine but the rollers are exceedingly close together and one moves faster than the other thus exerting a tearing or shearing action on each particle. Machines of this kind have been brought to a very high degree of refinement for grinding paints cosmetics and other materials.

An important adjunct to grinding is what is known as *sizing* that is to say the separation of ground material into various sizes of particles. These sizes are usually expressed by a figure giving the number of meshes to the line or inch of a wire screen through which the material will pass or of two screens of which it will pass one and not the other.

When substances can be suspended in water *classifiers* are frequently employed. One of the simplest is the *Spinkasten* a name derived from the German and meaning a pointed box. It consists of a box in the shape of an inverted pyramid. If a rapid flow of water enters such a box at the bottom and flows away at the top the velocity upwards of the water diminishes as it flows upwards since the cross-section of the box increases. Hence any powdered substance suspended in the water will be carried up only until the rate at which it sinks is equal to the rate of the upward flow of water. Thus only the finer particles reach the top and overflow with the water. The process of separating substances in this way by balancing their rate of sinking in water against the upward movement of the water is called *elutriation*. See also *ON DRESSING*.

Crustacea, one of the classes of the *Arthropoda* (q.v.) comprising crabs, shrimps, woodlice, barnacles etc. and distinguished from insects, arachnids, centipedes and other classes by the presence of two pairs of appendages.

the first and second antennæ, in front of the mouth. The class is represented by a vast number of highly different forms, mostly found in the sea, a few in fresh water or on land. The water



Crab

forms usually breathe by gills, but some of the land woodlice breathe by air tubes, like the insects. There is usually a distinct head, with a pair of eyes, two antennæ and three pairs of jaws, and the segments of the body are generally divisible into two regions, the cephalothorax, with large locomotor limbs, often covered above by a plate confluent with the head, the carapace, and the abdomen, which bears smaller and less important limbs.

There is often a marked metamorphosis in development, the newly hatched larva in many of the subdivisions of the group being a minute oval body with three pairs of limbs. It is known as the nauplius.

There are many instances in which the adoption of a sedentary life or of parasitic habits has so altered the structure that the organisms bear little, if any, resemblance to the typical members of the class.

The Crustacea are classified in five main divisions, but no definition can satisfactorily cover the variations in structure exhibited by many of the degenerate parasitic types which have arisen in most of the groups. The divisions are:

The Barnacle group (*Cirripedia*). Sedentary, degenerate, and marine, with a shell composed of several distinct pieces.

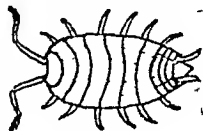
The typically Bivalve group (*Ostracoda*). Small, marine, or freshwater, active forms, with the carapace forming a bivalve shell enveloping the whole body, and the limbs simple in structure and greatly reduced in number.

The leaf-footed group (*Branchio-*

poda). The brine shrimp, water flea, etc. Medium or small-sized salt or freshwater species with the limbs broad and leaf-like and usually numerous, and the carapace large, sometimes bivalved, or else absent.

The oar-footed group (*Copepoda*). Mostly small marine species with the body segmented, and the limbs of the thorax, sometimes of the head, lengthened to act as oars for swimming.

The erab, shrimp, and woodlouse group (*Malacostraca*). Marine, freshwater or land species, often of large size, with the body composed of 19 segments and divided by the structure and function of the appendages into head, thorax, and abdomen.



Woodlouse

Cryolite, a mixed silicate of sodium and aluminium corresponding to the formula Na_3AlF_6 . It is found in large amounts in S. Greenland. Cryolite is an indispensable commodity in the preparation of aluminium (*qv*), and owing to the somewhat high price of the naturally occurring compound it has now been very largely replaced by synthetic cryolite.

Crypt, a chamber or compartment, under a church or public building. In early Christian churches it was usually built to hold either a saint's tomb, or relics of saints. It was often so well built and furnished as to become a church beneath a church. Canterbury, Winchester, Worcester, and Gloucester Cathedrals all have fine crypts. The Crypt of the Guildhall, London, has a very beautiful vaulted roof.

Cryptæsthesia, see **PSYCHICAL RESEARCH**.

Cryptamnesia, see **AMNESIA**.

Cryptogam (Gr. "hidden marriage"), a general term embracing all the lower or non-seed-bearing plants. The name was given to them before the development of microscopic technique made it possible to study their

sexual reproduction which is in fact much simpler and much easier to understand than in the case of seed bearing plants. The cryptogams are the ferns, mosses, algae and fungi.

Cryptography the name given to writing in cipher with the object of hiding the meaning from all who do not possess the key. Examples of cryptography are to be found in the books of Isaiah and Jeremiah. It was used by Julius Caesar. Its modern development in the form of cipher and code (qv) is a purely utilitarian device used for example in diplomacy and war.

Crypto-Jews also known as Marranos were Jews who outwardly accepted Christianity in face of the Spanish Inquisition while remaining Jewish at heart and observing in secret all the ritual of Judaism.

Crystal, a body usually bounded by symmetrically arranged plane surfaces possessing properties which differ in magnitude in different directions. Crystals may be formed in the laboratory from a saturated solution by slow evaporation or by cooling or from a supersaturated solution by introducing a minute fragment of the solute. A solid mass of the substance does not break irregularly but tends to take the same geometrical forms as when it grows from a liquid. This is explained by supposing that the atoms forming the crystal arrange themselves in regular patterns under the influence of their mutual attractions.

The study of crystals has led to their being divided into seven systems which are based upon what are called the axes of symmetry that is to say lines about which the crystal is symmetrical in its properties. These systems are *Triclinic* (three non-equivalent axes set obliquely to one another), *Monoclinic* (three non-equivalent axes two at right angles and the third oblique to both), *Rhombic* (three non-equivalent axes at right angles to one another), *Tetragonal* or *Quadratic* (three axes at right angles to one another two of them equivalent), *Regular* or *Cubic* (three equivalent axes at right angles

to one another). *Trigonal* (three axes in one plane the fourth at right angles to it), *Hexagonal* (the same but with six axes). Many substances are capable of forming crystals belonging to two different systems thus carbon in the form of graphite belongs to the trigonal in the form of diamond to the regular or cubic system. Any statement of the properties of a crystalline substance such as its refractive index, elasticity, conductivity of heat and electricity, rate of solution in solvents or chemicals which attack it should always be stated with reference to the particular axis considered since these properties have different values along all non-equivalent axes of any given crystal. This is neatly illustrated (Fig. 1) by cutting a plate from a large crystal and



FIG. 1

passing through it a wire heated by an electric current the surface of the crystal being thinly coated with wax. Heat is conducted from the wire along the plate at a different rate in different directions with the result that the wax is not melted in the form of a circle with the wire as centre but in some other shape such as an ellipse. The term *isotropic* is used to describe a substance having properties equal in value in all directions and crystals are therefore non isotropic substances.

The optical properties of crystals are exceedingly complicated and a perfect example of what has been said above. Light travels at a different speed along each axis of symmetry and this leads to the crystal having three indices of refraction. When a ray of light meets a crystal it is therefore broken up into two parts except in crystals of the regular system. This phenomenon is called *double refraction* (see Optics). It is commonly illustrated by placing a

Maestra and Sierra de Toar, of which the former includes Turquino (8400 ft), and Ojo del Toro (5200 ft). This is the only district where there is no coastal plain, the cliffs sloping sheer to the sea. The coastline is very broken, and has numerous natural harbours, there are scores of islands, including Pinos, off the S W coast, the Sabana Archipelago, the Camaguey Islands, and the Camareros Archipelago. For the most part the rivers are short, and flow either N or S from the central ridge, a notable exception is the Cauto, which is over 250 m long, and is navigable for a considerable distance by small vessels. Geologically the island is made up principally of igneous rocks, covered with alluvial soil.

Cuba is famous for its two leading agricultural products, sugar and tobacco. The latter, with the manufacture of cigars and cigarettes, yields a large revenue. Other products are coffee, fruits, including pineapples, bananas, and coconuts, and sponges. The fisheries also are of considerable value. Much of the natural wealth of Cuba has not yet been fully exploited, there is much timber, and some mineral deposits. Stock is raised, and there is room for further expansion. The manufactures are closely connected with agriculture, and include the tobacco industry, sugar factories, and the making of molasses and rum.

The climate is tropical, and there is a heavy rainfall in the wet summer season, but it is fairly well suited to Europeans, and generally healthy. Flora and fauna are extremely varied and rich, the trees include the palm, banyan, cotton-tree, and cedar, and there are hundreds of varieties of flowering shrubs and trees. There are many varieties of birds, reptiles, and fish, but only one or two native mammals, and no beasts of prey.

Education is fairly good, though there is a considerable percentage of illiterates, elementary education is

now free and compulsory. The people are generally Roman Catholics and Spanish-speaking. Cuba is a Republic, and government is carried on by a President, the Senate (36 members), and the House of Representatives (126 members). There is also a Cabinet on the European model. For local government the country is divided into six provinces, each with a Governor, and 119 municipalities each with a Mayor and municipal council, local government officers as well as members of the two Houses are elected by popular vote.

By far the largest town is the capital, Havana (588,100), others include Camaguey (48,800), Santiago de Cuba (45,000), and Cienfuegos (40,000).

Cuba was discovered by Columbus in 1492, and remained Spanish until the close of the 19th cent, when with American support in a war against Spain it became a Republic. Under temporary American administration in 1906-9, internal stability was secured after an initial period of unrest and thereafter, subject to an understanding with the U.S.A., the country has been independent. A revolution broke out at Havana in August 1933, when President Machado was forced to flee the country. Area 44,000 sq m, pop 3,600,000.

Cube, *see* ALGEBRA, GEOMETRY.
Cubeb, eastern condiment, made from dried unripe berries of a plant closely related to the pepper, cultivated in Sumatra and the Antilles. Cubebs are also used medicinally, as a stimulant and diuretic.

Cubic System, *see* CELLULOSE.
Cubism, *see* PAINTING, PICASSO.
Cuchulinn [KŪOHŌŌ'LIN], in Celtic mythology, a hero-king of Ulster, son of the Sun-God Lugh. Irish epic is largely concerned with his warlike deeds.

Cuckoo, a familiar spring visitor to Great Britain, an example of a large family of birds, found all over the world, in which, with few exceptions, the hen lays her eggs in the nests of smaller birds, and leaves them to be

atched and the young to be reared by the foster parents

The eggs match those of the victim species and thus escape detection. A cuckoo for example that lays blue eggs has the instinct to place them in the nest of a hedge-sparrow. There are thus strains as it were of cuckoo each adapted to impose on a particular species be it hedge-sparrow wagtail meadow pipit or others. The young cuckoo also participates in the imposture for soon after hatching it forcibly ejects from the nest the young of the foster parents thus securing for itself all the food they bring for the family. When full grown it feeds for itself for some weeks feeding upon



Cuckoo

insects particularly a hairy caterpillar and in the early autumn migrates South. On returning in the spring the female instinctively seeks as the foster parents of her young the same species to which she owed her upbringing whose eggs hers will match. Similar habits varying in detail with conditions have been observed in other species of old world cuckoo. In Madagascar however as in N America there are species which make nests and incubate their own eggs.

Cuckoo-pint, a succulent herbaceous wild plant with large glossy arrow-shaped leaves often spotted with dark purple and flowers arranged on a central spadix or column enclosed in a sheath. The sheath may be seen in early

spring in country lanes even before the leaves appear. The sheath and upper part of the spadix fall and leave a spike of conspicuous scarlet berries. The plant was formerly cultivated in the Isle of Portland and the starch obtained from its roots under the name of Portland sago used as a substitute for arrowroot.

Cuckoo-spit, the frothy substance produced on plants by immature specimens of insects known from their jumping powers as frog hoppers and related to the cicada (*g*). It is produced by liquid exuded from the alimentary canal mixed with air discharged into it from special breathing tubes and serves to protect the insect from drying up and probably also from enemies.

Cucumber a creeping plant of the family *Cucurbitaceae* (*g*) closely related to the melon pumpkin and marrow and probably originating in India. It is an annual plant with hairy leaves and tendrils by which it can be trained and the same plant bears male and female flowers. It is cultivated for its green ovary which if the ovules are prevented from being fertilised will develop into the familiar cucumber hence the male flowers are pinched off unless seeds are required. Many varieties are cultivated both under glass and exposed and they will grow in any good soil. The Sikkim cucumber from the Himalayas is a large variety 6 inches thick the gherkin of the W. Indies is small and spicy and used for making pickles.

Cucurbitaceae the Gourd family of dicotyledonous plants a large and important group of herbaceous plants with succulent stems climbing by means of tendrils which spring from the base of the leaf-stalks. The leaves are usually lobed and rough the flowers often large white red or yellow the fruit juicy or fleshy. They inhabit principally hot regions but a few are found in temperate climates especially Europe. Their properties are sometimes violent e.g. the common drug *Calocynthia*. The wild cucumber

another variety, grows in sandy deserts and bears a bitter oval fruit. The only plant of this family which is a native of Britain is the white bryony, which shares the properties of colocynth and the root of which has valuable medicinal properties. The *squirting cucumber*, so called from the freedom with which it expels the poisonous juice, together with the seeds, when ripe, is a very dangerous drug, a few grains of elaterium, a prepared form of this juice, bringing on symptoms of poisoning. Many species, however, produce edible fruit, for instance, the melon and cucumber, the water melon, and the vegetable marrow.

Cuddalore (*Kudalur* or *Gudalur*), chief town of the S Arcot district of Madras, British India, 20 m S of Pondicherry. There is a large coastal and inland trade. The chief exports are grain, indigo, oilseeds, and sugar; industries include weaving and dyeing. Cuddalore became a British possession in 1785. Pop (1931) 50,520.

Cudworth, Ralph (1617-1688), English divine, the principal member of a school of philosophers and theologians known as the Cambridge Platonists. He attacked Hobbes, and taught that the will was free, and that morality existed of itself and was not a product of the State.

Cuenca: (1) Mountainous and forested province of New Castile, Spain, bordered N by Guadalajara and S by Albacete. Timber is floated down the Tagus to Madrid. Honey, wax, wine, olives, cereals, and silk are produced in the N. Saw-milling, cloth- and pottery-making are carried on. Area, 6636 sq m, pop 312,300. (2) Picturesque capital town of (1), on the R Jucar. It has a Gothic cathedral, and was formerly a seat of learning. Pop 12,800. (3) City in Ecuador c 200 m S of Quito, it has a cathedral and a university, and manufactures woollen goods, pottery, and sugar. Pop c 42,000.

Cuirass [*kwiRAS'* or *KORAS'*], originally a leather coat or jerkin (Fr *cuir* = leather), worn by soldiers as a pro-

tection against pistol-shot and sword cuts. Varieties include the chain-mail and metal-studded coats of the Middle Ages, and the bronze and brass breast-plates of classical times. The name was also applied to the plate armour, both for breast and back, which succeeded jerkins in the 14th cent. In the 16th cent they were highly chased and decorated, especially in Italy. Light corselets were worn by the infantry in the 17th cent, and cuirasses by mounted soldiers. They are still worn on ceremonial parades by the Life Guards.

Cuirassiers, heavy cavalry evolved from the mounted men-at-arms of feudal days. An Austrian corps of *kyrissers* was formed in 1484, very heavily armoured, and there were 20 corps by 1705. The Prussian cuirassiers achieved a considerable reputation in the mid-18th cent under Frederick the Great. The French cuirassiers were first formed in 1666, and reached their maximum strength under Napoleon. There are still regiments of cuirassiers in the French and German Armies.

Culdees (*KUL'DEES*), a religious order in the ancient Celtic Church. The monks lived in Ireland, Scotland (especially Iona), and Wales, between the 9th and 14th cents, but little is known of their history.

Cullinan Diamond, found in the Premier mine, Cullinan, Transvaal, in 1907. It was bought by the Transvaal Government for £150,000, and presented to King Edward VII as the largest diamond known. It originally weighed over 3000 carats, but has been cut into 9 large stones, of which the largest weighs 316 carats.

Culloden, moor in NE Inverness, Scotland, celebrated as the scene of the bloody victory of the Duke of Cumberland over the Young Pretender in 1746. Culloden was the last battle fought in Britain.

Culture, Diffusion of. The powerful ruling class in the early history of mankind depended for much of its prestige upon the possession of

valuable. Gems and metal were therefore universally considered to be fraught with magical virtue to be in fact veritable givers of life.

Prospecting parties led by members of aristocratic families set out in search of such treasures passing E through India and Assam and onward across the wide Pacific to Central America and thence N almost to the Arctic.

Wherever these people went they found the inhabitants in a cultural as food gathering state at the mercy of wind and sun and establishing themselves as rulers they organised the people taught them to cultivate the soil by irrigation and to build houses gave them law and order and in short civilised them.

All through the Pacific Islands traces of this early cultural wave are to be seen in remains of building operations far beyond the power of the present inhabitants enormous rough hewn rectangular blocks of stone standing piled together and arranged in a circle finely trimmed but equally heavy blocks carefully built in the form of terraces and platform. We find canals connected with a long-disused irrigation system and colossal stone statues.

These remains are always to be discovered in the vicinity of pearl beds metal mines or other sources of mineral wealth thus revealing the aim of the early settlers.

Throughout this area the people have stories of wonderful strangers who came from the sky taught the inhabitants to be civilised instructed them in their arts and crafts and rudimentary sciences and then departed with a promise to return again. These wonderful strangers were regarded as gods as the creators of the universe and in the popular mind are magnified into superhuman and immortal forms.

It is easier for men to forget than to remember. Ancient customs are maintained for the simple reason that they are ancient customs but their real meaning may be forgotten and new

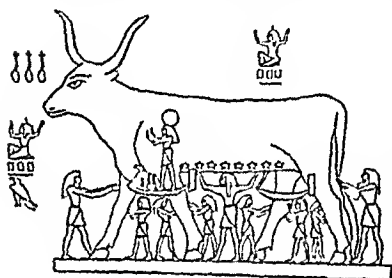
meanings or perhaps no meaning at all added. In many savage rites may be traced the remains of a former reasoned religion. In folk lore and superstitious custom may be seen the faint re-echo of the magic of the East the cultus of the ancient Egyptian wizards.

In this way and in this way only is it possible to account for similarities in primitive religion organisation folk lore and custom throughout the world and for the presence in some areas of food gatherers without tradition whose only articles of culture can very easily be traced to a comparatively modern origin. These people had migrated in the earliest days to remote spots on the earth which were not visited by the civilised and civilising men of old.

Easter Island and the Pacific
Easter Island that tiny isolated half way house between the ancient East and the American Continent with its remains of prehistoric stone houses and its colossal stone statues has since its discovery been a veritable battle ground of conflicting opinions concerning origins. It has done more to foster the false idea of a sunken continent and a lost race than any other place in the world though most of the Pacific Islands have contributed their share to this untenable theory. All major movements of great land masses had taken place in the Tertiary ages many thousands of years before man had made his appearance so that even if Pacific Islands despite the fact of their consisting largely of coral a marine growth are but mountain tops still standing above water level there is no reason to suppose that the immense stone remains were the works of an antediluvian race. Had such a race ever existed it could hardly have chosen the snow-clad peaks as a habitat. Actually Easter Island is a strong argument in favour of the diffusion of culture and indicates that the outward movement was E from the vicinity of the Mediterranean for on the back of the head of Hoa haka nana is an Easter Island statue now

at the British Museum, may easily be distinguished two line engravings of faces protruding their tongues, and each tongue represents a cobra, which is not indigenous to the W, but is a sacred animal and the central motif of many mystic cults in India.

The Maya Remains The vast and interesting remains in Central America (Honduras) are also an intellectual battleground, but nevertheless so highly civilised a people as their builders must have been, with a sun-worshipping cult and pyramids, with a complicated calendar of definitely Oriental form, and with a hieroglyphic script (still undeciphered), can hardly have developed, and that in an amaz-



Hathor, the Divine Cow, represented as the Sky

ingly short time, for no better reason than the culture-clash of tribes of Indians for whose culture no very good reason can be shown. In Mayan decorative stonework can be traced a spiral design which the independent origin theorists claim to represent a conventionalised snake, and they are supported by the fact of the snake playing a very large part in Aztec and Toltec mythology, but despite this the design compares very favourably with early Indian works in which the elephant's tusk is represented in exactly the same manner.

Even in China we find the earliest remains of past culture on the Yellow R (gold-bearing), and they are distinguished by pyramids of Babylonian form.

Other Early Cultures The Sumerian, Babylonian, and Assyrian civilisations are all of great antiquity, and are closely allied and interwoven one with another.

Recent excavation works at Ur of the Chaldees, apart from tombs and gems and works of art, have revealed in a 12-foot thick deposit of alluvium that the flood of our Bible story was no myth, but an actual fact, thus tending to support the theory that folk-tales are not without foundation.

These old Mediterranean cultures vie one with another for priority of place. The origin of the Sumerian culture being so far unknown, it is sometimes credited with perhaps a few thousand more years than it actually possesses, but there is one very important point so indisputable that it is sometimes overlooked by those who support Sumer's claims against Egypt's. This is that the R Euphrates, though it overflows its banks alone and unaided each year, does so at an inopportune moment, namely, at the beginning of the summer, and subsides when the heat is still great, so that young plants would be scorched to death.

The engineers who constructed the Euphrates irrigation system must have worked with a foreknowledge that could be gained only in Egypt, where the natural flood cycle is perfect for agriculture.

Ancient to Modern There is no room for controversy concerning the growth of modern civilisation. All know that it is based partly upon the Roman (law and building), partly upon the Greek (art and philosophy), and a little on the ancient East (religion). To weld the ring, it will be necessary to indicate briefly the origin of Roman and Greek culture.

The Roman takes much from the Greeks, but its earliest period is based on the Etruscan culture, itself of very complicated origin, but traceable through the Swiss lake pile-dwelling peoples to the Nordic kitchen-midden remains, and from these S and E.

back to Asia Minor through succeeding layers of peasant culture and Bronze Age remains

The Greek culture was affected by several influxes but was based mainly on the very early culture revealed in the remains on the Isle of Crete. In this again Sumerian and Egyptian beginnings may be found

Conclusion Culture is a continuous process sometimes advancing in great tidal waves sometimes receding but never still

The continued existence of food gatherers indicates that culture is a superimposition by no means natural and ready to arise from within. The possession of law and religion of rudimentary arts and crafts and of a class system by savages reveals that these things were taught to them by some conquering race of old and this is confirmed by their folk tales

The fact that primitive cultures are always to be found in pearl or mineral bearing areas suggests that the ancient civilisers came in search of these things and the earliest people to appreciate such articles of adornment were the inhabitants of the arsa surrounding the Mediterranean. Of these the first to change from food gatherers to food producers were the Nile Valley dwellers and the change was due to the river's peculiarity of seasonal flood. Therefore although there is no proof there is a great deal of fact throughout the world to indicate that all we have and are is due to the genius of mystic seekers of remote antiquity. *See also* PROTOHISTORIC MAN

BIBLIOGRAPHY W J Perry *Child of the Sea* (1933) *The Growth of Civilisation* (1926) G Elliot Smith, *Evolution of the Drama*

Cumberland Richard (1732-1811) English dramatist author of many sentimental comedies including *The West Indian* (1771) *The Fashionable Lover* (1772) and *The Impostors* (1789). Cumberland was very sensitive to criticism and was saturated for

this fault in the character of Sir Fretful Plagiarist in Sheridan's *The Critic*

Cumberland Wm. Augustus, Duke of (1711-1763) British general third son of George II. Served at Dettingen 1743 and as commander of the Allied troops was defeated by Saxons at Fontenoy 1745. Quelled the Jacobite rebellion 1745-6 by taking Carlisle and winning the battle of Culloden. His punitive measures earned him the title Butcher of Cumberland

Cumberland, the most NW county of England bounded N by Solway Firth and Scotland W by the Irish Sea F by Northumberland and Durham and S by Westmorland and Lancashire. The county includes the N part of the Lake District with Derwentwater Bassenthwaite Ennerdale Water Crummock Water Buttermere West Water Thirlmere and part of Ullswater. Stretching out fanwise from the S are many well known mountains including Scafell Pike (3194 ft.) the highest peak in England Bow Fell (2970 ft.) Iklévellyn (3118 ft.) Scafell (3180 ft.) and a number of others. Farther N separated from the main mass by a valley in the Keswick district is another range that includes Skiddaw (3050 ft.) and Saddleback (2847 ft.) There is a fairly narrow coastal plain on the W and a large plain in the N. The valley of the R Eden divides the mountains from the W heights of the Pennine Chain including Cross Fell (2930 ft.) The principal rivers are the Eden Derwent Ick Hamont and S Tyne. Rainfall is heavy combining with a moderate temperature to produce considerable crops of oats turnips and other roots. There are large areas of hill pasture and though cattle are raised sheep are of much greater importance the native breed being famous for the quality of its wool

Cumberland has considerable mineral wealth coal and iron are the principal deposits and zinc and lead are also found. Stone quarries produce slate limestone and granite

Iron and steel goods and shipbuilding are the leading industries, while mining and the fisheries are valuable. The largest towns are Carlisle, the county town (57,107), Workington (24,691), and Whitehaven (21,142). The chief holiday centre is Keswick.

Area, 1520 sq m. pop (1931) 262,897

Cumberland Mountains, a long range of hills, plateaux, and mountains, in the E of the United States, extending from Pennsylvania into Alabama, attaining its greatest height (c 4000 ft) in Virginia. There are valuable mineral deposits, including coal and marble. The many underground caverns are famed for their great natural beauty. The S end of the range divides the Cumberland and Tennessee Rs., and the picturesque gorge of Cumberland Gap is notable.

Cumbræ, Great and Little, two islands forming part of the county of Bute, Scotland, between the island of Bute and Ayrshire. The larger island is 4 m long by 2 m broad. The inhabitants rely mainly on the custom of visitors, but some farming and fishing are done. There is a cathedral at Millport, a college, and a biological station. Little Cumbræ is 1½ m long and nearly 1 m wide, and has a lighthouse. Pop (both is.) 5950.

Cumbrian Mountains, see **LAKR DISTRICT**

Cum Dividend, see **STOCK EXCHANGE**

Cumulative Preference Share, see **STOCKS AND SHARES**

Cumulus, see **CLOUDS**

Cunard, Sir Samuel, Bart. (1787-1865), British engineer and founder of the Cunard Steamship Line, was born in Nova Scotia. He formed a company (1839) to carry the Anglo-American mails, and his first wooden paddle steamer, the *Britannia*, made her maiden voyage in 1840 in 14 days 8 hours. Since then the Cunard company has always been in the forefront of shipbuilding enterprise. Their first iron steamer, the *Persia*, did 14 knots, the *Scotia* (1862), their last paddle-steamer, was, next to the *Great*

Eastern, the largest steamer in the world, and held the record for trans-Atlantic sailing in 8 days 22 hours, their *Aurania* (1883) was fitted with the first suites of cabins, their *Lucania* (1901) was the first American liner to carry wireless apparatus, the *Carmania* (1908) was the first Atlantic boat to have turbine engines. The *Lusitania* was sunk by the Germans in 1915. The *Mauretania* (built 1903) held until 1928 the Atlantic speed-record. The company is now one of the largest owners of liners and cargo boats in the world.

Cunas, see **RED INDIANS**

Cunaxa, Battle of (401 B.C.), between Cyrus the Younger with Orientals and Greek mercenaries, and the Persians under his brother Artaxerxes. Cyrus was slain, but his Greeks refused to surrender and were allowed to march to the coast. This march is described in Xenophon's *Retreat of the Ten Thousand*.

Cuneiform ("wedge-shaped"), the name given to a form of writing used in inscriptions by the ancient Babylonians, Assyrians, Persians, and Hittites. The characters, each of which is in the form of a wedge, were developed from earlier ideographs, and generally speaking they represent, not individual letters, but syllables or entire words. See A. J. Booth, *The Discovery and Decipherment of the Trilingual Cuneiform Inscriptions*, (1902). See also **ETHNOLOGY**.

Cuneo: (1) Province of Piedmont, Italy, between the Cottian and Maritime Alps Area, 2868 sq m. The products are chiefly cereals, fruit, flax, hemp, marble, and iron, whilst silk, linen, and marble goods are manufactured. Pop (1931) 619,600.

(2) Capital of province and episcopal see of Piedmont, c 50 m S of Turin. Founded in 1120, it passed to the French in 1796. There is a recently restored cathedral as well as a 12th-cent. Franciscan church. Amongst the chief manufactures are silk and cotton. Pop. (1931) 36,160.

Cunliffe-Lister, Sir Philip (b. 1884),

British politician served in the Army (1914-1) was Secretary to the Ministry of National Service (1917-18) and to the Board of Trade (1920-1). He was President of the latter Board under Baldwin (1922-3 and 194-9) and continued to hold the post under the National Government of 1931 succeeding Lord Passfield as Secretary of State for the Colonies in which capacity he represented Britain at the Ottawa Conference 1932.

Cunningham, Allan (1785-184) Scots poet whose works include collections of traditional British songs and stories and lives of British artists. He is better known however as the author of many original songs and poems. His most popular lyric is *A Wet Sheet and a Flowing Sea*.

Cunningham-Graham, Robert Bonino (b 185) Scots author. His early writings are largely Socialist in tendency many of them deal with Spain, N Africa and S America. He was MP for N Lanarkshire from 1896 to 1899. His works include *A Life of Hernando de Soto* (1903), *Don My Deeds* (1925) and *The Hosts of the Conquest* (1930) and numerous volumes of short essays.

Cup an alcoholic beverage consisting of the lighter wines such as claret, sherry, cider, hock, champagne etc mixed with soda water and sweetened with sugar. Fruit juices, slices of cucumber, lemon peel and occasionally herbs and spices may be added.

Cupboard, originally an open shelf or board (or set of shelves) on which to place cups, now a rectangular or triangular box with a door or doors either fixed into a recess of a room or of a piece of furniture (e.g. sideboard cupboard) or forming a separate piece of furniture. The interior may have shelves or hooks and rails for hanging or (in the case of small cupboards) may be unlined. Small cupboards are found inside the flaps of bureaux. Large cupboards may enclose a folding bed. Very large cupboards forming part of the structure of a house are in

effect small rooms and may even have windows.

The cupboard is an elaboration of the chest or coffer the lid being placed at the side to form a door instead of on the top. The butch or store cupboard is the earliest known. In churches the ambry is a cupboard for the reception of the sacred vessels or reserved Sacrament. The livery cupboard had shelves on which were placed the dishes as they came into the hall. It was used also for broken meats distributed to the poor and thus became a dole cupboard. The doors were perforated for ventilation. (For the Court Cupboard see FURNITURE.) Corner cupboards with shelves glazed or solid doors and either hanging in the angle of the wall or resting on a stand were very attractive pieces in the 17th and 18th cents. They were made in oak, walnut and mahogany. A set of shelves without doors is a dresser. In the 18th cent the movable cupboard fitted with sliding trays enclosed by doors and drawers below became a wardrobe. The more modern wardrobe is usually fitted for hanging clothes and may have a drawer below. Elaborate Victorian wardrobes had separate compartments for hanging clothes, cupboards with sliding shelves and sets of drawers.

Cupellation the name of an ancient method still practised to some extent of extracting silver from ores. The method consists in alloying the silver with lead and then removing the lead from the lead-silver alloy by melting it in a receptacle made from bone ash and called a cupel. Air is then passed over the surface of the metal oxidising the lead to litharge which is blown off. See also SILVER.

Cupid (KO PIN) in Roman mythology the god of love, the son of Venus represented as a winged infant with bow and arrows. Innumerable paintings and literary accounts of him exist. His Greek name was Eros.

Cupola, in architecture a spherical roof. The term is also used to describe the cover of gun emplacements.

and part of the apparatus used in large-scale steel production

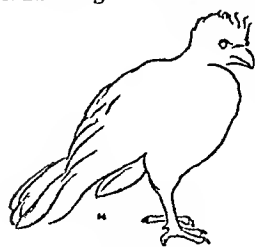
Cuprammonium Process, see CELLULOSE

Cuprite, see COPPER

Cupuliferae, a family of trees distributed chiefly in the temperate zones of the N hemisphere and also in tropical Asia. It includes the beech, chestnut, oak, and birch

Curaçao (or *Curaçoa*), the most important island in the Dutch W Indies, 40 m long and 10 m wide, with an area of 374 sq m. It lies in the Caribbean Sea, off the N coast of Venezuela. The chief products are tobacco, sugar, aloes, maize, and beans, and cattle, phosphates, straw hats, and salt are exported. Curaçao liqueur, made from oranges, was originally made on the island, but today it is mainly manufactured in Holland. The chief town is Willemstad, which is situated on the harbour of St Anna. Curaçao was discovered and settled by the Spaniards in 1627, but it has been a Dutch possession since 1634, except in 1798 and 1807-16, when it was held by Great Britain. Pop (1931) 45,100. See also LIQUEURS

Curassows, a family of game-birds, inhabiting Central and S America, but



Curassow

related to the brush-turkeys (*q v*) of Australia. **Curate**, originally, a clergyman in charge of a parish (a "cure of souls"). In England the title is now given to a clergyman who assists the incumbent of a parish

Curb Market or **Street Market**, see STOCK EXCHANGE

Curfew, a signal given, generally by the ringing of a bell, to warn inhabitants of a town to extinguish their fires. It was used to avoid the danger

of fires at night when houses were built of wood. The practice gradually died out after 1100, when the prohibition of lights after curfew was removed. The custom still exists at Okehampton, Devonshire and elsewhere. At Oxford the bell known as "Great Tom" is rung 101 times every evening at 9.5, as a signal for the closing of all college gates. The term now denotes rather the order frequently given in times of political unrest confining citizens to their homes between certain hours of the night, e.g., by the Curfew Law, 1920-1924, inhabitants of Belfast were ordered to remain within doors from 10.30 p.m. to 5 a.m., owing to political disturbances

Curia Regis, a court of law established by William I and attended by all the great officers of State as a final Court of Appeal. After undergoing various changes in subsequent reigns, it was ultimately divided into three courts, viz. Exchequer, Common Pleas, and King's Bench, and lasted thus until the Judicature Acts of 1873-75

Curia Romana, the name given to the judicial and administrative organisations for the Government of the Roman Catholic Church, including the body of Cardinals and officials who reside at Rome. They are organised in committees and "congregations," which are placed in charge of the Church's various activities. See also CARDINAL

Curie, a unit of measurement in radio-activity (*q v*). One curie is the amount of radium emanation (radon, *q v*) which is in equilibrium with 1 gramme of radium. It is equivalent to 0.63 of a cubic millimetre. This quantity is somewhat large for everyday use, and the unit generally employed is the "millicurie," which is one-thousandth part of a curie. The term was adopted in honour of Mme Curie (*q v*) the discoverer of radium (*q v*). See also ATOM

Curie, Pierre (1859-1906) and **Marie Skłodowska** (b. 1867), French physicists and pioneers in research on radio-activity, were married in 1895. In

1898 they obtained radium from pitch blende and later discovered the properties of radium. A special laboratory was established for them and after Professor Curie's death Mme Curie succeeded to his professorship at Paris. She received the Nobel Prize jointly with her husband in 1903 and for her own work in 1911 and has been decorated by many countries. She was presented with a gramme of radium by the women of the USA in 1911 and with \$50,000 subscribed in America in 1912. She has established a radioactivity laboratory at Warsaw her birthplace. Mme Curie is renowned as the author (with her husband) of one of the most valuable scientific works of the century. She has given her name to the curie, a unit of radium emanation. Her book *Traité de Radioactivité* was published in 1910.



Marie Curie

Curityba, capital town of the State of Paraná, Brazil, situated on a plateau 3000 ft above sea level. There are a university, porcelain works and match factories. The exports include maté, tea, tobacco and beef. Pop. (1930) 100,100.

Curlew, a bird related to the snipe but distinguished by its larger size and long curved bill. It breeds in moorlands where it feeds on insects, worms and berries but also frequents the sea shore and muddy estuaries. It is European in distribution.

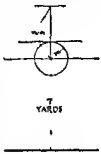
The name is also given to the stone curlew, thick knee or No folk plover, a summer visitor to England where it is generally found in chalk country. It nests on the ground and is related to the plovers.

Curling, a game resembling hockey

origin but has been popular in Scotland since 1600. Flat stone discs not more than 44 lb in weight or 36 in in circumference fitted with a handle are thrown along a rink or channel of ice towards a fixed mark known as the tee round which a circle of 7 ft radius is marked.

A rink should be 38 yds long with a tee at either end. There are 4 players a side each throwing 2 stones from the foot score (see diagram). A stone not reaching the hog score is called a hog and removed from the rink.

When all 16 stones have been thrown the scores are counted and the game proceeds from the opposite end. Each stone lying nearer the tee than an opposing stone scores 1 point. Each side is directed by a captain or skip from the tee end of the rink. Under



Curling

the skip directs the ice may be swept with brooms in front of a stone.

the tee, and this "sooping" forms an important part of the game. While delivering the stone each player stands on an iron plate fitted with spikes, called the *cran pit*. The modern form of stones dates from c 1800, previously natural stones of various shapes and sizes had been used. In Canada and U.S.A. "stones" are usually of iron, weighing 60-70 lb. The ruling body of curling is the *Royal Caledonian Curling Club*, which was formed in 1838 as the Grand Caledonian Curling Club. The title of "Royal" was granted in 1842.

Curragh, a stretch of common, with an area of c 5000 acres in co. Kildare, Ireland. It is famous for its race-course, and was a training-ground for troops during the World War. In March 1914 a political crisis was caused through General Hubert Gough and other officers tendering their resignations as a protest against being sent to enforce Home Rule in N.E. Ulster. This episode is known as the *Curragh Incident*.

Currant, the red, white, and black currant are deciduous shrubs (species *Ribes*) related to the gooseberry. Cultivation of the red and white differs somewhat from that of the black. The former currants require a free soil, neither clayey nor sandy. The black requires a soil with a high water-retaining capacity. All varieties are propagated by cuttings taken in autumn and grown in a sandy soil in a shaded position. A dressing of half-decayed manure should be given in May, and red and white currants thinned in June and all useless shoots removed. Black currants are pruned as soon as the leaves have fallen. The fruit ripens in July. Black currants cannot be kept back on the tree, but red currants may be kept back by enclosing the trees in mats.

Currency, the quality of being current, or circulating freely. The term is often used to denote money and other media of exchange, such as bank-notes, bills of exchange, etc. Sometimes the

term is restricted to legal tender money. This may be *metallic currency*, i.e. coins and convertible paper notes, or it may be *paper currency*, i.e. inconvertible notes. See also MONEY, BANKING AND CREDIT.

Currency Notes, notes issued by the British Treasury in 1914 for £1 and 10s. The notes continued in circulation, taking the place of gold sovereigns and half sovereigns, until 1928 when they were withdrawn from circulation, and their place taken by new Bank of England notes of the same denominations. Currency notes were sometimes called *Treasury Notes*, or *Bradburys*, from the signature of the Secretary to the Treasury which was on them.

Current-bedding, or *False-bedding*, geological term for an irregular lamination shown by certain beds, especially sandy deposits. The laminae of the strata are parallel to one another over a short distance, but are oblique to the general stratification of the whole deposit, and constantly change their direction, indicating variations of direction in the course of the currents by which the sediment was deposited.

Currie, Sir Donald (1825-1909), British shipowner, served with the Cunard Steamship Co., and later founded the Castle Line between Liverpool and Calcutta, 1862, and between England and S. Africa, 1872. This line merged with the Union Steamship Co. as the Union-Castle Line, 1900, with Currie as chairman. He represented Britain in the Kimberley diamond dispute, and was adviser on the Transvaal annexation question, 1877-8.

Curry, an Indian dish composed of various solids—fish, meat, fowl, or eggs—served in a hot flavoured sauce.

For the preparation of the dish commercially prepared curry powder may be used, but it is better to pound the powder for oneself in a mortar. For this take a dried chili, $\frac{1}{2}$ doz. corns of black pepper, some coriander and cummin seeds, and a small piece of turmeric. For the curry mixture, chop

fine a small piece of the heart of a lettuce slice thin a small sour apple add the juice of a lemon a pinch of black pepper and a dessertspoonful of the powder Then fry to a light brown some finely chopped onions adding a chopped clove of garlic (if this is liked) and a little butter and flour boil these in a pint of gravy and stir in the curry mixture Let this simmer and add whatever ingredient is to be curried

Cursor Mundi a northern English poem of the early 14th cent which relates in 24 000 lines the history of the world as told in the Bible It is relieved by the insertion of numerous legends and other matters

Curtain Fire a line of shells exploded just in front of advancing friendly infantry to shield them from attack Sometimes curtain fire is laid down behind an enemy force when entrenched to prevent their reinforcement

Curtesy (law) Formerly a husband became entitled to a life interest in any land of which his wife died seized in fee simple or in tail provided children capable of taking the land as heirs had been born to her during the marriage and even though they had died before or after the mother The husband was called *tenant by the curtesy* Curtesy is now abolished except in regard to entails and cannot arise there unless the wife dies intestate See also ESTATE DOWER

Curtilage the land which surrounds and belongs to a dwelling house

Curtis Charles (b 1860) American statesman entered the legal profession and became county attorney in Kansas in 1884 In 1893 he entered Congress and in 1907 was elected Senator a position he has ever since occupied In 1919 he was elected Republican Vice-president of the U.S.A.

Curtis, Charles Gordon (b 1860) American inventor of a steam turbine which has greatly influenced the development of the propulsion of ships and the generation of electricity

Curthus Marcus legendary Roman hero through whose self sacrifice the city was saved (360 B.C.) A chasm appeared in the Forum at Rome which it was prophesied would close only when Rome's most valuable possession was thrown into it Curthus declared that nothing more precious than a fearless soldier could be found and rode his horse into the gap which immediately closed

Curwen John (1847-1910) originally a Nonconformist minister better known for his enthusiastic propaganda of the tonic sol fa system (q.v.) invented by Miss Glover (1780-1867) He founded the Tonic Sol fa Association in 1853 and the Tonic Sol fa College 10 years later He published many works on music in general and his system in particular and was the subject of a memoir by his son J.S. Curwen published in 1882

Curzon of Kedleston George Nathaniel 1st Marquess (1859-1925) English statesman eldest son of 4th Baron Searsdale was secretary to Lord Salisbury 1885 Conservative M.P. for Southport 1885 Under Secretary for India 1891-2 and for Foreign Affairs 1895-8 He was appointed Viceroy of India and made an Irish peer in 1899 He reformed finance taxation and education created the N.W. Frontier Province and encouraged trade with Persia His partition of Bengal aroused opposition and following a dispute with Kitchener over military control he resigned in 1905 Created Earl 1911 he became Lord Privy Seal under Asquith President of the Air Board 1916 and President of the Council and member of the War Cabinet under Lloyd George Created Marquess 1917 Succeeded Balfour as Foreign Secretary 1919-24 negotiated peace with Turkey at Lausanne 1920-3 and was connected with the Ruhr dispute 1923 initiating negotiations for the formation of the Reparations Commission He was Chancellor of Oxford University 1907-13 Author of *Russian Central Asia*

(1889), *The Persian Question* (1892), *Problems of the Far East* (1894), and *British Government in India* (1925)

Cushendun, Ronald John McNeill, 1st Baron (b 1861), British politician. Acting Under-Secretary for Foreign Affairs, 1928. Editor of *St James's Gazette*, 1900-3, raised to peerage, 1927

Custard Apple, fruit of tropical plants of the genus *Anona*. Large roundish fruits, dark brown, and of delicious flavour, growing on fairly large trees

Custard Powders, *see* EGGS
Custards, To Make.

(1) Baked

1 egg
 $\frac{1}{2}$ oz sugar
 $\frac{1}{2}$ pint milk
 $\frac{1}{2}$ teaspoonful vanilla essence

Beat egg and sugar together. Add milk and vanilla essence. Pour into greased pie-dish, grate nutmeg on top. Stand in a baking-tin surrounded by hot water, and bake in a slow oven (300° F) for c 1 hour

(2) Steamed

3 eggs (or 2 and 2 yolks)
 $\frac{1}{2}$ —1 oz sugar
 $\frac{1}{2}$ pint milk
 $\frac{1}{2}$ teaspoonful vanilla essence

Beat eggs and sugar. Add milk and flavouring. Pour into greased mould and steam gently until set, c 1-1 $\frac{1}{2}$ hours. Turn out and serve

(3) Caramel

Custard (*see* Steamed)
3 oz loaf sugar } caramel
3 gill water }

Allow sugar and water to cook slowly until they are of a light coffee colour. Pour into a hot plain soufflé-mould, and turn round and round until sides are well coated. Strain in custard mixture (made with warm milk). Cover with greased paper, and steam 1-1 $\frac{1}{2}$ hours

(4) Custard Tart

1 egg
1 pint milk
 $\frac{1}{2}$ oz sugar
Short-crust pastry

Line flan ring with short-crust paste, fairly thin (*see* PASTRY, SWEET). Make custard by pouring hot milk on to well-beaten eggs and sugar. Cook gently until it begins to thicken. Pour into flan ring. Put into hot oven (c 450° F), then cook at 350° F c $\frac{1}{2}$ hour

Customary Freehold, *see* TENURES

Custom House, an office established by the Government at which import and export taxes are levied, bounties and drawbacks paid, and all other goods passing across the frontiers of a country are declared. Customs houses are usually situated on the sea-coast or other frontier, but also exist in large cities for sealed goods registered through, and at aerodromes for goods sent by air

Customs Duties, import duties, or duties levied on goods imported into a country. The taxes are administered in Great Britain by His Majesty's Commissioners of Customs and Excise, and collected by customs officials at ports of entry. Duties may be *ad valorem*, i.e. assessed as a percentage of the value, or *specific*, i.e. assessed on a given unit of weight or quantity. They may be for *revenue*, i.e. assessed on goods certain to be imported in large quantities (e.g. tea, sugar, tobacco), in spite of the tax, or they may be *protective*, i.e. the tax may tend to keep out imports, thus, "protecting" the home manufacture of the products taxed (*See also* TARIFF, NATIONAL REVENUE AND EXPENDITURE)

Customs Union, agreement of two or more countries to allow goods to pass untaxed between them, import duties being charged only on goods entering those countries from outside the Customs Union. The most famous Customs Union was the German Zollverein, which existed among the German States from 1819 until the formation of the German Empire in 1871. An important Customs Union also was founded among S African colonies in the latter part of the 19th cent. Germany and Austria also reached an agreement for a Customs

Union in 1931 but objections by France were made and the agreement was not ratified

Custos Rotulorum, the keeper of the records of an English county who is appointed by the Crown and is usually a person of rank

Cutch, (or *Acch*) a native protected State in Gujarat Bombay India a peninsula bounded N by the Rann of Cutch S by the Indian Ocean and the Gulf of Cutch Cutch is rocky and barren and crossed E-W by mountains Chief crops are cotton wheat barley and millet while the natives make silk and cotton embroidery and silver work The State is governed by a native chief the Maharaja and is British protection The capital is Bhuj Area 7616 sq m excluding the Rann of Cutch pop (1931) 513 800

The Rann (or Runn) of Cutch is a salt desert N of the State Its area is c 8000 sq m During the S.W. monsoon the hard dry surface becomes flooded up to several feet subsiding to leave a salt-encrusted tract

Cuthbert St (168) English saint probably born in Northumbria He was Bishop of Lindisfarne in A.D. 685 and was noted for piety and missionary enthusiasm He died on the island of Farne Feast March 10

Cutlass, a basket hilted sword with curved blade used in the 18th and 19th cents. at sea chiefly in hand-to-hand fighting by boarding parties

Cutlery strictly cutting instruments for domestic use but extended to sharp-edged steels such as razors and sometimes to forks and spoons Originally carbon steel was the only material available for good cutting instruments and it was often economised by being used merely to edge a wrought iron blade but this practice has entirely ceased since steel has been manufactured by modern processes Nevertheless the finer kinds of cutlery such as razor blades and scissors of good quality need to be made with the highest classes of steel which are both more expensive and

more difficult to work For domestic cutlery carbon steel has been almost entirely displaced by so-called stainless steel of various types these being alloys of iron nickel and chromium which resist the acids in food and in the air (see IRON AND STEEL) Early stainless steel knives were coated with an untarnishing metal and were always blunt as sharpening removed the protective coating from the cutting edge The bright metal of stainless spoons and forks is usually like silver in appearance with an occasional slight blue tinge Air does not affect it and a slight rubbing with a duster will keep the lustre Some of these stainless metals contain a little copper long contact with lemon juice vinegar and acid foods should therefore be avoided Modern platings with the appearance of actual silver will wear for years

The industry includes the use of a large variety of substances for the manufacture of handles including plated or ornamented continuations of the blades silver bone and ivory and its various imitations (see PLASTICS)

Kitchen Cutlery The stainless knife is especially useful in preparing vegetables Types of knives have retained their old patterns—the pointed cooks or chefs knife the long thin ham or beef knife the boning knife with curved blade etc The double bladed knife is a modern development serrated on one side for cutting tomatoes onions and other vegetables with a slippery surface and the other a very fine cutting edge for slicing The grapefruit knife with its curved serrated edge copes effectively with the cutting of the skins between the sections A pie server which combines the purposes of a spoon and knife with its two sharpened edges and broad blade saves labour in large establishments Spoons and forks of aluminium are unsatisfactory as they bend and break easily For basting galvanised iron spoons are suitable for sauces, wooden spoons free from

ledges to entrap dirt, and for lading, enamelled-iron, stainless steel, or even aluminium, as there is little strain

Cutting Equipment Sharpeners usually consist of two adjacent sets of discs, through which the knife is drawn, a simple process compared to the old-fashioned sharpening which would blunt a blade still more unless the correct technique was followed. Peelers remove peeling, and prevent cutting of the operator's hands. Some have slicers whose connecting blades can be adjusted to any thickness, increasing speed, eliminating strain, and producing even slices for better cooking. New-style tin openers cut the lid off the tin neatly and turn down the jagged edge. Modern mincers, or choppers, have a selection of cutting discs which will shred a cabbage into long strips, chop peel, cut meat into fairly coarse chunks, and bread into pieces suitable for bread and milk.

Cutlet, small slice of veal, mutton, or lamb, trimmed into shape, generally part of the rib

To trim

- 1 Remove chine bone by sawing
 - 2 Shorten the cutlet bones
 - 3 Divide meat into separate cutlets
- If small, cut midway between bones, if large, cut down side of bone, reserving the flesh which comes between bones for rolling and serving separately
- 4 Beat the meat with cutlet bat, meat chopper, etc
 - 5 Trim off fat, leaving c $\frac{1}{4}$ in border
 - 6 Make a diagonal cut from fat to bone just below meat
 - 7 Clean tip of bone

To Cook Brush with melted fat, sprinkle with salt and pepper, and fry or grill

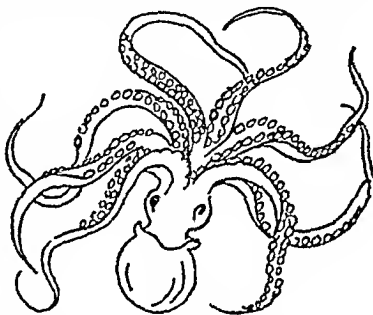
To Serve Place a cutlet frill on each, with a border of mashed potatoes around, so that they overlap each other. Serve peas in centre of dish and pour hot sauce round them

Cuttack (1) District of Bengal, British India, in the province of Orissa. It is well irrigated, and comprises three main divisions. a marshy, coastal

strip, a stretch of plain; and a hilly tract on the W. Rice, jute, sugar, wheat, and maize are grown. Area, 3517 sq m, pop 2,064,700

(2) City and capital of the above, on the R Mahanadi, of military and commercial importance. The city is famous for its silver filigree work. Cuttack was taken by the British in 1803. Pop (1931) 51,000

Cuttle Fish, a marine mollusc (*q.v.*) of the class *Cephalopoda*. It is provided with an internal shell, an ink-sac, and 10 tentacles encircling the mouth, 8 shorter and furnished with suckers throughout their length, and 2 longer and retractile, with the suckers limited to a terminal knob. The



Cuttle Fish

suckers are used for crawling and for seizing prey

The name "cuttle fish" is sometimes applied to a large number of different kinds of cephalopod, including the squid and even the octopus (*q.v.*), but strictly belongs to the species, sometimes known as the *sepia*, in which the shell is the familiar "cuttle bone," a common object on our sea-shores. This shell is situated beneath the skin of the back, is calcareous, and protects the whole body from behind the head. It is given to cage-birds to peek for the chalky matter they require, and before the invention of blotting-paper was used as a powder for drying ink. It serves also as a fertiliser of soils and for tooth powder.

In ancient times the ink of the

cuttle was used for writing and gives its name to the paint still called sepia. By the cuttle fish itself it is employed as a screen by being discharged into the water when the animal shoots backwards movement being effected by the forcible ejection of a current of water from the lower side of the body.

The common British species of *Sepia* is 8 or 8 in long and feeds mainly on fish and crustaceans. Its eggs are grape-like and fastened in bunches to seaweed. There are also many species in temperate and tropical seas some of which are eaten by man.

Cuvier Georges Léopold, Baron (1769-1833) French naturalist was lecturer at the Ecole du Jardin des Plantes and Professor at the Collège de France and the Jardin des Plantes. He held important posts under Napoleon and his successors in the Ministry of Education and Council of State.

His works include a systematic classification of the animal kingdom, lectures on comparative anatomy and important treatises on fossil and living fishes, reptiles and mammals. Among his books are *Recherches sur les ossements fossiles de quadrupèdes* (1817) and *Leçon animal distribué d'après son organisation* (1817).

Cuxhaven [KOOKSIHAFEN] German free port at the mouth of the Elbe. In the last decade of the 19th century the harbour and works were greatly improved and enlarged and can now accommodate the largest liners. The Harburg Amerika line uses Cuxhaven as a port. There is a considerable fishing industry and the town is favoured as a holiday resort from Hamburg. Pop 18,000.

Cuyp [djɛp] the name of a family of Dutch painters of whom the most famous were

JACOB GERRITZ CUYP (fl. 1600-50) was the elder. Very little is known of his life. He painted a number of portraits and large portrait groups which are straightforward in treatment and conception—honest if somewhat uninspired renderings of the people, the interiors and the landscapes that he knew. The date of his death is not known but his last known picture was painted in 1649. Specimens of his work exist in galleries in Amsterdam, Rotterdam and Berlin.

ALBERT CUYP (1620-1691) his son was born at Dordrecht where he seems to have had considerable standing and to have spent most of his life. His best and most characteristic paintings are his landscapes frequently of river scenes with cows and horses well placed and well-drawn. His colouring is delicate and warm without being



"Portrait of Self" Albert Cuyp

muddy, his scenes are atmospheric, with a fine effect of distance, and he ranks high among Dutch landscape painters. There are also portraits and equestrian paintings, and a few mythological and biblical pictures by Cuyp, but it is not certain whether he was responsible for the still-life paintings of fruit and game which are frequently attributed to him. Many of his paintings are in private collections in England, and there are a large number at both the Dulwich and National Gallery. The *Cattle with Herdsman* at the latter may be mentioned.

Cuzco {K665'K6} (1) Second largest department in S Peru. It is mountainous, with low, jungle-covered plains. Cocoa, coffee, sugar, tobacco, maize, and cereals are produced, and the district is rich in gold, silver, coal, lead, copper, and iron. Cattle and sheep are raised. There are practically no manufactures. Area, 55,716 sq. m., pop. (1927) 700,000.

(2) Town, and capital of the department, lying in a valley 11,380 ft. above sea-level. It was founded by Manco Capac in the 11th cent., and was the capital of the Inca Empire. The remains of the gigantic fortress of the Inca period, the Convent of Santo Domingo, the cathedral, and the university are of note. There are a library and museum, and many monasteries, convents, churches, and hospitals. Industrial plant includes cotton mills, breweries, and sugar and chocolate mills. Pop. (1928) c. 40,000.

Cyanamide, NCNH_2 , is a colourless crystalline body melting at 40°C . It is the amide of cyanic acid (*qv*), and is prepared by the interaction of ammonia and cyanogen chloride. The product itself is of little importance, and the term "cyanamide" is often erroneously applied to calcium cyanamide, which is an important fertiliser, and is also the basis of a method for the fixation of nitrogen. See also CALCIUM and NITROGEN.

Cyanates, see CYANIC ACID

Cyanoic Acid, HCNO , is a volatile

liquid prepared by the distillation of urea (*qv*). It is an extremely unstable substance, and if heated above 0°C it explodes with the formation of a polymeric cyanide (HCNO)_n. Another polymeric acid of cyanic acid is cyanuric acid, also of the formula (HCNO)₃. Cyanic acid gives rise to a series of salts, the cyanates.

Cyanogen chloride may be looked upon as the chloride of cyanic acid. It is used in organic syntheses and as a military poison gas. It can be manufactured by passing chlorine into an aqueous solution of hydrocyanic acid. It is easily condensable to a liquid, boiling-point 13°C , melting point -5°C .

Cyanides. The cyanides are the salts of hydrocyanic acid, HCN (*qv*). The chief cyanides of industrial importance are the metallic cyanides, and since they all possess similar properties, they will be considered here, and not under the headings of their metallic radicals.

The principal cyanides of industrial importance are those of the alkali metals, sodium and potassium. Cyanides are used in industry for a variety of purposes. One of the most important is as an electrolyte in electroplating solutions, the chief metals deposited with the help of cyanides being zinc, silver, gold, and cadmium.

An extremely important use of sodium cyanide is in the extraction of gold and silver from their ores (see GOLD).

Hydrogen cyanide or **Hydrocyanic acid** (*Prussic acid*), HCN , is a colourless liquid of peculiar ("bitter almond") smell. It has a boiling-point of 26°C and a melting-point of -15°C . It is manufactured by the action of acids on sodium or potassium cyanide. It is extremely poisonous, and is used to an increasing extent as an insecticide and vermin killer. Fumigation by hydrocyanic acid is carried out in orchards to free trees from pests, for this purpose a tent is placed round the tree, and the acid generated by dropping sodium

cyanide into sulphuric acid. It is insufficiently volatile by reason of its low boiling point to spread rapidly throughout the enclosed space.

Similar methods are employed for the fumigation of ships and warehouses except that special precautions have to be taken to see that the enclosed spaces are quite free from the gas before human access is again allowed on account of its extremely poisonous nature.

The use of liquid hydrocyanic acid gas stored in cylinders has also been tried but the risk of spontaneous explosion is rather high. Another method of applying the gas is by spreading distomaceous earth which has been soaked in the liquid and from which the gas gradually effuses. This method has met with a considerable degree of success especially in Germany.

Hydrocyanic acid is fairly widely distributed in nature in combination in the form of glucosides such as amygdalin which is found so bitter almonds.

Cyanogen, C_2N_2 is a colourless gas with a peculiarly characteristic odour inflammable and extremely poisonous. It liquefies at $-21^\circ C$ and melts at $-31^\circ C$. The gas may be obtained by heating mercury cyanide and also by the reaction of potassium cyanide with copper sulphate. It is used for purposes of chemical synthesis and is transported as the liquid in cylinders under pressure. It has also been used as a poison gas for military purposes but as it is soluble in water it is not very effective in this respect.

Cybele [sɪˈbeɪl] Greek goddess daughter of Uranus and wife of Cronus (p. 10) also known as Rhea. She loved Atys and punished him for breaking his vows to her. She is represented as symbolic of fertility and many obscene rites were connected with her festival. The Corybantes (p. 10) were her priests.

Cycads The plants of this order are found in the tropical and subtropical regions of America and Asia and at the

Cape of Good Hope. They are trees or shrubs with usually simple sometimes dichotomous trunks marked with leaf scars and resembling palms and tree ferns. The leaves are pinnate and curled in the bud like fan fronds. The flowers are always terminal resembling cones. The pollen is carried by the wind and the plants are unisexual.

The cycads occur at the present time only in small numbers but they were common in earlier geological periods up to the Cretaceous.

Cyclades, group of islands in the Greek archipelago among the chief of which are Syra, Andros, Paros, Delos, Naxos, Ceos, Tenos, Thera, Kythiros and Melos. The highest mountain (3,941 ft) is on Naxos, the largest island. Tenos produces marble. Melos sulphur and Ceos valonia. Wines, tobacco and hides are exported. The islands many of which are of volcanic origin comprise an area of 1,000 sq. m. Melos was a centre of Aegean civilization (p. 10). Delos a religious and political focus and once head of the Delian League (p. 10). In modern times Syra was a shipping centre until its eclipse by the Piræus. The quarries of the famous Parian marble are exhausted. Pop. 130,000.

Cyclamen group of low growing herbaceous plants of the Primrose family found in the mountains of the Mediterranean and Central Europe. They have globose bulb-like roots from which arise long stalked heart-shaped leaves.

and white pink lilac or crimson flowers. One species the snow bread so called from its being the favourite food



Cyclamen

of the Sicilian wild boars, has been introduced into the woods of Kent and Sussex. It flowers in winter and spring, and the fruit is drawn down to the soil by the flower-stalk, which coils spirally for that purpose. Many kinds of *Cyclamen* have been cultivated, both for greenhouses and as outdoor plants, on account of the beauty of their flowers.

Cyclic Poems, a series of poems dealing with intimately connected stories or events, covering a more or less extended period. Thus the legends associated with the siege of Troy and its consequences were told, not only in the *Iliad* and the *Odyssey*, but also in a considerable body of poems of the Trojan Cycle, which have not survived. There was similarly a Theban cycle of epics.

Cyclometer, a device for counting the number of revolutions of a cycle wheel and thus recording the distance traversed. It consists of a train of wheels geared to one another in the ratio 10 to 1, so that the revolutions of the first indicate units, of the second tens, and so on. Simple trains of toothed gearing are employed when friction is undesirable, as in gas and electricity meters, but for other purposes the jumping counter is employed whereby each figure moves suddenly instead of gradually, thus facilitating reading.

Cyclone, see WINDS

Cyclopes [sɪˈkloʊpiːz], mythical giants, the sons of Uranus (Brontes, Steropes, and Argos), who represented thunder, lightning, and the thunderbolt. They were banished into Tartarus until Jupiter called on them for aid in his war with Cronos (qv). Each had one eye in the middle of his forehead. The walls of Tiryns, in ancient Greece, were supposed to have been built by them. Hence the term *cyclopean* is used of any ancient Greek polygonal masonry resembling that of Tiryns, as well as of ancient structures of stupendous weight or dimensions. Polyphemus (qv) was not one of the original Cyclopes, but a later creation.

Cygnets, the name for a young swan (qv).

Cylinder, see GEOMETRY.

Cyme, an irregularly branched inflorescence in which later flowers are produced laterally on the stem of the first flower, as in forget-me-not.

Cynewulf (fl. 18th cent.), Anglo-Saxon poet. Little is known of him, except that he wrote four poems, signed in runic characters. These are *Juliana*, *Elene*, *The Ascension*, and *The Fates of the Apostles*, all written in the vernacular. Other poems attributed to him include certain of the *Riddles*, *The Phoenix*, *Guthlac*, and *The Dream of the Rood*. The poems that are certainly his show much religious fervour but relatively little literary merit.

Cynosephalæ, Battles of: (1) 364 B.C. the Thébans and Thessalonians routed the forces of Alexander of Phœrac. (2) 107 B.C. the Romans under Flaminius defeated Philip V of Macedonia.

Cyperaceæ, the sedge family of plants somewhat resembling grasses, but differing from them in the possession of triangular solid stems, closed leaf sheaths, and no ligules. The inflorescence is a group of spikes of glumes, in the axil of each being three stamens and one carpel.

Cy-près, see TRUST

Cypress, a group of evergreen cone-bearing trees and shrubs, with small adnate opposite leaves, and small globular cones on a few fleshy scale-leaves. They are traditionally associated with graveyards and funeral rites.

Cyprian, St. (c. 205-258), Bishop of Carthage, and an early Christian martyr. A wealthy pagan scholar, he was converted to Christianity in 246, and became Bishop of Carthage in 249. He was martyred in 258, during the persecution of Emperor Valerian. He left a collection of letters, and other writings, very valuable as sources of Church history.

Cyprus, large Mediterranean island some 3600 sq. m. in extent; a British

Crown Colony It is situated c 50 m S of Anatolia and its E extremity Cape St Andreas is 60 m. W of Syria. The surface is composed of 2 mountain systems the S considerably higher than the N separated by an extensive plain. The S ranges take the general name of Olympus and include Mounts Troödos (6400 ft.) Adlphi (5300 ft.) and Pafousta (5100 ft.) The highest point of the N range is c 3000 ft. The most notable rivers are the Yialias and Pedias both of which flow roughly N.E. across the plain. The other rivers are small and frequently dry up in the summer. The climate is fairly healthy and except in the summer there is a sufficiency of rainfall.

Cyprus was once famous for its forests but few now remain. Agriculture is the main pursuit, and under British sovereignty (since 1914) the inhabitants who are naturally backward and conservative are being encouraged to adopt modern and scientific methods. Irrigation schemes are being carried out and the natural fertility of the soil steadily exploited. The chief crops are fruit grain vegetables and cotton. Mules cattle and sheep are reared there are important sponge fisheries.

Cyprus formerly produced many valuable minerals especially copper but in these days except for a moderate production of salt asbestos and marble there is comparatively little mining though recently attempts have been made to apply modern methods in the exploitation of the island's copper resources. Trade is retarded by the dearth of harbours. Famagusta has been improved considerably and handles most of the traffic.

The inhabitants are mainly Greeks and Turks the E Church is that of the majority but there is a fair percentage of Moslems. The total population is 348 000 the largest towns are Nicosia the capital (37 000) Larnaca (12 000) Famagusta (10 000) and Limasol (15 000).

Cyprus which was affected to some extent by the Aegean civilisation (qv)

has been occupied by the Phoenicians Greeks Persians and Romans. The island was seized by Richard I of England in 1191 and it subsequently became part of the territory of the kings of Jerusalem (see CRUSADES). Turkey took it from the Venetians in 1571 and in 1878 ceded its administration to Britain by whom it was annexed at the outbreak of the World War becoming a Colony in 1925.

Cyprus, Church of, a church of the Eastern Orthodox faith in communion with the other Orthodox churches but independent except when Cyprus was part of Venetian territory (1193-1571) when it was compelled to recognise papal supremacy.

Cyrano de Bergerac, see BERGERAC CYRANO DE

Cyrenaica, administrative subdivision of Italian Libya bordering on the N African coast from the Egyptian frontier to Tripolitania (qv). Most of the region forms part of the Libyan desert but there is a large cultivable area at Kufra. Barley is exported and camels and cattle are raised. The sponge fisheries are of some importance. Cyrenaica was colonised by Greeks in early times later forming part of Roman Africa. It passed subsequently under Arab and Turkish control. Finally in 1912 the coast was occupied by the Italians they did not however gain control of the interior until after the World War owing to the opposition of the Senuss. The capital is Benghazi near which are some important salt ponds. Area c 73 000 sq m. pop. (1931) 200 000.

Cyrene famous ancient Greek city of Cyrenaica believed to have been founded on the advice of the Oracle at Delphi. A noted intellectual and cultural centre it acquired also great trade and wealth. It was the capital of Cyrenaica (qv) and its fortunes waxed with those of the State. Excavations have revealed parts of the walls temple of Apollo the acropolis various sculptures the great temple baths and theatre also tombs with

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Acid, HCNO , is a volatile

liquid prepared by the distillation of urea (q v). It is an extremely unstable substance, and if heated above 0°C it explodes with the formation of a polymer *cyanmelide* (HCNO). Another polymeride of cyanic acid is *cyanuric acid*, also of the formula (HCNO). Cyanic acid gives rise to a series of salts, the cyanates.

Cyanogen chloride may be looked upon as the chloride of cyanic acid. It is used in organic syntheses and as a military poison gas. It can be manufactured by passing chlorine into an aqueous solution of hydrocyanic acid. It is easily condensable to a liquid, boiling-point 13°C , melting-point -5°C .

Cyanides The cyanides are the salts of hydrocyanic acid, HCN (q v). The chief cyanides of industrial importance are the metallic cyanides, and since they all possess similar properties, they will be considered here, and not under the headings of their metallic radicals.

The principal cyanides of industrial importance are those of the alkali metals, sodium and potassium. Cyanides are used in industry for a variety of purposes. One of the most important is as an electrolyte in electroplating solutions, the chief metals deposited with the help of cyanides being zinc, silver, gold, and cadmium.

An extremely important use of sodium cyanide is in the extraction of gold and silver from their ores (see GOLD).

Hydrogen cyanide or **Hydrocyanic acid** (*Prussic acid*), HCN , is a colourless liquid of peculiar ("bitteralmond") smell. It has a boiling-point of 26°C and a melting-point of -15°C . It is manufactured by the action of acids on sodium or potassium cyanide. It is extremely poisonous, and is used to an increasing extent as an insecticide and vermin killer. Fumigation by hydrocyanic acid is carried out in orchards to free trees from pests, for this purpose a tent is placed round the tree, and the acid generated by dropping sodium

cyanide into sulphuric acid. It is sufficiently volatile by reason of its low boiling point to spread rapidly throughout the enclosed space.

Similar methods are employed for the fumigation of ships and warehouses except that special precautions have to be taken to see that the enclosed spaces are quite free from the gas before human access is again allowed on account of its extremely poisonous nature.

The use of liquid hydrocyanic acid gas stored in cylinders has also been tried but the risk of spontaneous explosion is rather high. Another method of applying the gas is by spreading diatomaceous earth which has been soaked in the liquid and from which the gas gradually diffuses. This method has met with a considerable degree of success especially in Germany.

Hydrocyanic acid is fairly widely distributed in nature in combination in the form of glucosides such as amygdalin which is found in bitter almonds.

Cyanogen, C_2N_2 , is a colourless gas with a peculiarly characteristic odour inflammable and extremely poisonous. It liquefies at $-21^\circ C$ and melts at $-34^\circ C$. The gas may be obtained by heating mercury cyanide and also by the reaction of potassium cyanide with copper sulphate. It is used for purposes of chemical synthesis and is transported as the liquid in cylinders under pressure. It has also been used as a poison gas for military purposes but as it is soluble in water it is not very effective in this respect.

Cybele [sibēla] Greek goddess daughter of Uranus and wife of Cronos (qv) also known as Rhea. She loved Atys and punished him for breaking his vows to her. She is represented as symbolical of fertility and many obscene rites were connected with her festival. The Corybantes (qv) were her priests.

Cycads. The plants of this order are found in the tropical and sub-tropical regions of America and Asia and at the

Cape of Good Hope. They are trees or shrubs with usually simple some times dichotomous trunks marked with leaf scars and resembling palms and tree ferns. The leaves are pinnate and curled in the bud like fan fronds. The flowers are always terminal resembling cones. The pollen is carried by the wind and the plants are unisexual.

The cycads occur at the present time only in small numbers but they were common in earlier geological periods up to the Cretaceous.

Cyclades, group of islands in the Greek archipelago among the chief of which are Syra Andros Paros Delos Naxos Ceos Tenos Thera Kythnos and Melos. The highest mountain (3,294 ft) is on Naxos the largest island. Tenos produces marble. Melos sulphur and Ceos valonia. Wine tobacco and hides are exported. The islands many of which are of volcanic origin comprise an area of 1000 sq. m. Melos was a centre of Aegean civilisation (qv). Delos a religious and political focus and once head of the Delian League (qv) in modern times Syra was a shipping centre until its eclipse by the Piræus. The quarries of the famous Parian marble are exhausted. Pop. 130,000.

Cyclamen group of low growing herbaceous plants of the Primrose family found in the mountains of the Mediterranean and Central Europe. They have globular bulb like roots from which arise long stalked heart shaped leaves and white pink lilac or crimson. One species the called from its being the fa



Cyclamen.

of the Sicilian wild boars, has been introduced into the woods of Kent and Sussex. It flowers in winter and spring and the fruit is drawn down to the soil by the flower-stalk, which coils spirally for that purpose. Many kinds of *Cyclamen* have been cultivated, both for greenhouses and as outdoor plants, on account of the beauty of their flowers.

Cyclic Poems, a series of poems dealing with intimately connected stories or events, covering a more or less extended period. Thus the legends associated with the siege of Troy and its consequences were told, not only in the *Iliad* and the *Odyssey*, but also in a considerable body of poems of the Trojan Cycle, which have not survived. There was similarly a Theban cycle of epics.

Cyclometer, a device for counting the number of revolutions of a cycle wheel and thus recording the distance traversed. It consists of a train of wheels geared to one another in the ratio 10 to 1, so that the revolutions of the first indicate units, of the second tens, and so on. Simple trains of toothed gearing are employed when friction is undesirable, as in gas and electricity meters, but for other purposes the jumping counter is employed whereby each figure moves suddenly instead of gradually, thus facilitating reading.

Cyclone, *see* WINDS

Cyclopes [SI'KLOPES], mythical giants, the sons of Uranus (Brontes, Steropes, and Arges), who represented thunder, lightning, and the thunderbolt. They were banished into Tartarus until Jupiter called on them for aid in his war with Cronos (*qv*). Each had one eye in the middle of his forehead. The walls of Tiryns, in ancient Greece, were supposed to have been built by them. Hence the term *cyclopean* is used of any ancient Greek polygonal masonry resembling that of Tiryns, as well as of ancient structures of stupendous weight or dimensions. Polyphemus (*qv*) was not one of the original Cyclopes, but a later creation.

Cygnets, the name for a young swan (*qv*).

Cylinder, *see* GEOMETRY

Cyme, an irregularly branched inflorescence in which later flowers are produced laterally on the stem of the first flower, as in forget-me-not.

Cynowulf (fl. 18th cent.), Anglo-Saxon poet. Little is known of him, except that he wrote four poems, signed in runic characters. These are *Juliana*, *Elene*, *The Ascension*, and *The Fates of the Apostles*, all written in the vernacular. Other poems attributed to him include certain of the *Riddles*, *The Phoenix*, *Guthlac*, and *The Dream of the Rood*. The poems that are certainly his show much religious fervour but relatively little literary merit.

Cynosephale, Battles of: (1) 364 B.C. the Thebans and Thessalonians routed the forces of Alexander of Phœræ. (2) 197 B.C. the Romans under Flaminius defeated Philip V of Macedonia.

Cyperaceæ, the sedge family of plants somewhat resembling grasses, but differing from them in the possession of triangular solid stems, closed leaf sheaths, and no ligules. The inflorescence is a group of spikes of glumes, in the axil of each being three stamens and one carpel.

Cy-près, *see* TRUST

Cypress, a group of evergreen cone-bearing trees and shrubs, with small adnate opposite leaves, and small globular cones on a few fleshy scale-leaves. They are traditionally associated with graveyards and funeral rites.

Cyprian, St (c. 205-258), Bishop of Carthage, and an early Christian martyr. A wealthy pagan scholar, he was converted to Christianity in 246, and became Bishop of Carthage in 249. He was martyred in 258, during the persecution of Emperor Valerian. He left a collection of letters, and other writings, very valuable as sources of Church history.

Cyprus, large Mediterranean island some 3600 sq. m. in extent; a British

Crown Colony It is situated c. 50 m S of Anatolia and its E. extremity Cape St. Andreas is 60 m W of Syria. The surface is composed of 2 mountain systems the S considerably higher than the N separated by an extensive plain. The S ranges take the general name of Olympus and include Mounts Troödos (8100 ft), Adelphi (5300 ft) and Pafos (4100 ft). The highest point of the N range is c. 3000 ft. The most notable rivers are the Yialias and Pedias both of which flow roughly N.E. across the plain. The other rivers are small and frequently dry up in the summer. The climate is fairly healthy and except in the summer there is a sufficiency of rainfall.

Cyprus was once famous for its forests but few now remain. Agriculture is the main pursuit and under British sovereignty (since 1914) the inhabitants who are naturally backward and conservative are being encouraged to adopt modern and scientific methods. Irrigation schemes are being carried out and the natural fertility of the soil steadily exploited. The chief crops are fruit, grain, vegetables and cotton. Mules, cattle and sheep are reared; there are important sponge fisheries.

Cyprus formerly produced many valuable minerals especially copper but in these days except for a moderate production of salt, asbestos and marble there is comparatively little mining though recently attempts have been made to apply modern methods in the exploitation of the island's copper resources. Trade is retarded by the dearth of harbours. Famagusta has been improved considerably and handles most of the traffic.

The inhabitants are mainly Greeks and Turks; the Church is that of the majority but there is a fair percentage of Moslems. The total population is 348,000; the largest towns are Nicosia (the capital) (137,000), Larnaca (12,000), Famagusta (10,000) and Limasol (15,000).

Cyprus which was affected to some extent by the Aegean civilisation (q.v.)

has been occupied by the Phoenicians, Greeks, Persians and Romans. The island was seized by Richard I of England in 1191 and it subsequently became part of the territory of the kings of Jerusalem (*see* CRUSADES). Turkey took it from the Venetians in 1671-3 and in 1878 ceded its administration to Britain by whom it was annexed at the outbreak of the World War becoming a Colony in 1915.

Cyprus, Church of, a church of the Eastern Orthodox faith in communion with the other Orthodox churches but independent except when Cyprus was part of Venetian territory (1193-1671) when it was compelled to recognise papal supremacy.

Cyrano de Bergerac, *see* BERGERAC
CYRANO DE

Cyrenaica, administrative subdivision of Italian Libya bordering on the N. African coast from the Egyptian frontier to Tripolitania (q.v.). Most of the region forms part of the Libyan desert but there is a large cultivable area at Kufra. Barley is exported and camels and cattle are raised; the sponge fisheries are of some importance. Cyrenaica was colonised by Greeks in early times, later forming part of Roman Africa. It passed subsequently under Arab and Turkish control. Finally in 1911 the coast was occupied by the Italians; they did not, however, gain control of the interior until after the World War owing to the opposition of the Senussi. The capital is Benghazi near which are some important salt pans. Area c. 73,000 sq. m. pop. (1931) 60,000.

Cyrene, famous ancient Greek city of Cyrenaica, believed to have been founded on the advice of the Oracle at Delphi. A noted intellectual and cultural centre it acquired also great trade and wealth. It was the capital of Cyrenaica (q.v.) and its fortunes waxed with those of the State. Excavations have revealed parts of the walls, temple of Apollo, the acropolis, various sculptures, the great temple baths and theatre, also tombs with

inscriptions. The harbour, called Apollonia, is the modern Marsa Susa.

Cyril, St., (1) (c 318-386), Bishop of Jerusalem, a defender of orthodoxy against Arianism, for which he suffered deprivation of his see.

(2) (c 370-444), Bishop of Alexandria, a defender of orthodoxy against heretics and Jews. He played a large part in the Nestorian controversy.

(3) (c 825-869), a Christian missionary who spent most of his life in the conversion of the Slavs. He is said to have been the inventor of the Cyrillic alphabet, an adaptation of the Greek alphabet still used in Russia, Bulgaria, and other Slav countries.

Cyrus the Great (d 528 B C), founder of the Persian Empire. Head of a Persian tribe, he overthrew the Median Empire and became King of the Persians, c 555 B C. Opposed by Babylon, Egypt, Lydia, and Sparta, he defeated Croesus of Lydia at Sardis, 546 B C, and conquered Babylon, 539, thus becoming ruler of the ancient E world. A wise and tolerant ruler, he released the Jews from Babylon, and permitted them to rebuild Jerusalem.

Cyst, a cavity in the tissues of the body, containing fluid or semi-solid matter varying in appearance and consistence. Sebaceous cysts, due to dilatation of the sebaceous glands, often occur just beneath the skin. Dermoid cysts, containing hair, teeth, and other skin structures, are found in the ovaries, testes, and skin. Cystic tumours are liable to occur in any part of the body and may be due to abnormal retention of the secretion of glands, as when cysts form in the kidney owing to obstruction of the ureter. They are often developed in old people, especially on the head or upper eye-lid. When superficial, they are easily removed by a surgical operation. Hydatid cysts, often affecting the liver, are due to bladder-worms (q v).

Cythera, most southerly of the Ionian islands, 10 m S of Cape Malca, Greece. It is c 20 m long, its greatest breadth c 12 m, and its

chief village is Capsali. In the fertile districts cotton, corn, olives, and wine are produced, and the chief exports are cheese, flax, cotton, and salt. A peculiarity of the coast are two stalactite caves. Remains of the magnificent temple of Aphrodite of Cythera are in the Church of St Kosmas. The island was sacred to Aphrodite, who was said to have emerged here from the foam of the sea.

Cytology, see CELL.

Cytoplasm [pron sī'-TO-PLAZM], the ground substance in which all other organs of any cell either of a plant or animal are embedded. See also CELL.

Czech [CHEK] Language and Literature. Czech is a member of the W. Slavonic branch of the Slavonic group of Indo-European languages (see under SLAVONIC LANGUAGES, and TABLE INDO-EUROPEAN LANGUAGES). It has also been known as Bohemian. It is the official language of Czechoslovakia.

Its literature is possibly older than that of any other Slavonic language, and there are rhymed legends, coloured by the priestly outlook, dating from early in the 14th cent. The movement of Jan Hus (q v) gave a great impetus to religious literature both in prose and verse, notably in the work of Peter Chelčický (1390-1460). The Renaissance brought a W influence to bear upon Czech literature. After 1620 there was a complete split between the Roman Catholics and the defeated Protestants, and the latter emigrated and took with them the greater part of the literary culture. Among these emigrants was Comenius (Jan Amos Komenský, 1592-1670), a voluminous and versatile writer both in Latin and Czech. Late in the 18th cent the Austrians prohibited the use of the Czech language by decree, but this did not prevent a powerful literary revival. Josef Dobrovský (1753-1829) was a great philologist and grammarian, who did much to rebuild the language on its ancient foundations. Then came a succession of poets: Jan Kollar (1793-1852), Karel

Mácha (1810-1836) Jan Neruda (1834-1891) Two great oases belong to the years before the World War J Vrchlický (1852-1912) poet critic and translator and J V Sládek (1845-191) poet and translator of many of Shakespeare's plays In the new national literature of Czechoslovakia the outstanding name is Karel Čapek (qv)

Czechoslovakia [TCHĚKOSLOVAN KŘO] republic of Central Europe set up after the World War being in effect a union of Czechs and Slovaks two peoples of S Slavonic stock previously included in the Austro-Hungarian empire Among the inhabitants are other races principally German and some though comparatively few Poles Jews Russians and Hungarians Boundaries are largely artificial except where formed by mountains Germany lies to the W and N Poland to the N and E and Hungary and Austria to the S

The mountains nearly all belong to the Central European system The Carpathians are in the NE and E and slope into a large S basin around the upper reaches of the Tisa river The N Carpathians extend far into the S roughly across the centre of the country to form high plateaux and there are local ranges all sloping S



Bratislava Main Square.

into another great lowland district To the W a valley separates them from the high tablelands and mountains of the Bohemian-Mähr-Hohenzollern

and the Böhmer Wald in the SW Finally a large valley immediately N of these systems separates them from the Erzgebirge Sudetes and Riesenge-



Prague Charles Bridge.

birge which form the NW and part of the N border Streams are valuable chiefly for irrigation but the Tisa Elbe and March carry heavy traffic Czechoslovakia has no coast but possesses certain treaty rights on the Elbe and in the ports of Stettin and Hamburg Bratislava (Pressburg) in the extreme S is a valuable Danubian port

The climate is moderate fairly warm in the summer and with a good rainfall Snow falls on the mountains but there are no extremes of heat or cold It is an excellent farming country with rich forests covering about a third of the total area Modern intensive farming methods are used especially in the W under French and German influence The E people are more conservative but also raise large crops The most notable products are sugar beet potatoes rye wheat

barley, oats, maize, hops, and grapes, giving rise to vigorous agricultural industries, including brewing and sugar manufacture. The large fruit crop is used mainly at home. There are large herds of cattle, sheep, and swine, as well as vast flocks of geese. Timber is exported widely. Coal is the most important mineral, followed by iron, graphite, silver, salt, lead, and copper. Industries include metal-founding, mining, and textile, glass, chemicals, furniture, and paper manufactures. A favourable trade balance is maintained. The largest towns are Praha (Prague), the capital (850,000), Brno (Brunn, 261,000), Bratislava (Pressburg, 124,000), and Ostrava Moravská (125,000).

The dominant religion is Roman Catholicism, though there is a fairly strong Protestant body. Elementary education is free and compulsory, and there are higher, technical, agricultural, and other special schools, and universities at Prague, Brno, and Bratislava. There are also schools for the minority races. The principal languages are Czech and German. Army service is compulsory for men between 20 and 60, and a standing army of c 140,000 is maintained. The air force numbers c 6500.

Czechoslovakia consists of Bohemia, Moravia, part of Silesia, Slovakia, and Carpathian Ruthenia. Government is conducted by an elected President, and by two Parliamentary Houses, the Senate (150 members) and the Chamber of Deputies (300 members). The Senate is elected for 8, the Deputies for 6, and the President for 7 years. The franchise is open to all citizens above 21 years of age (26 for Senate elections), votes are cast for parties, not for individuals.

Though the Czech nation was under foreign domination for many years as a part of pre-War Austria-Hungary, it remained, racially, quite separate, despite all efforts to Austrianise or Germanise the people. The second half of the 19th cent saw nationalism growing, and resentment against for-

eign domination came to a head in the World War. As a Slavonic race both Czechs and Slovaks sympathised with Russia and the Allies, and in the early months of the War were passively resistant to the Central Powers, large bodies of conscript troops deserting to the Allies. The organisation of the Czech campaign was largely due to Professor Masaryk, who subsequently became first President. He organised the troops who deserted, and secured their recognition. Other troops formed divisions of the Russian Army, and, during the revolution, kept the Germans from using Siberian supplies, and regaining their Russian war prisoners.

Owing to the efforts of Professor Masaryk during the World War the Czechoslovaks were recognised as an Allied nation, and when, at the close of the World War, Dr. Beneš, as Foreign Minister, notified the Allies of the formation of an independent State, this was ratified in the peace treaties. First efforts were to establish internal order, and to take a dignified place in international affairs. With various fluctuations, a firm and constructive policy has been followed, and the two most difficult problems, those of the German minority, and the status of the constituent divisions of the country have been solved, the latter by the establishment of provincial and federal administration.

Area, 54,210 sq m, pop (1930) 14,728,200.

Czenstochowa, Polish town on the R Warta, celebrated for the Pauline monastery, once one of the wealthiest in Europe, in the church of which is the miracle-working "Black Madonna," a painting of the Virgin and Child, adorned with costly jewels, that has been there since 1382. The town manufactures paper, textiles, etc. Pop (1931) 117,700.

Czernin, Ottokar, Count (1872-1932), as Austro-Hungarian Minister at Bucharest (1912) was able to preserve Rumanian neutrality till 1916. Appointed Foreign Minister, 1916, he urged

Germany to sue for peace supporting the negotiations of Prince Sixtus of Austria with England and France. Participated in the Treaty of Brest Litovsk 1918 and strove with Count Tiza to preserve the Austrian Empire but resigned two months later after failure of peace negotiations with France.

Czernowitz (Rum. *Cernaui*) capital of Bukovina Rumania on the right bank of the Pruth. A Greek

Orthodox Cathedral the Armenian Church and the University are the most notable buildings. Considerable commerce in agricultural produce cattle wood and wool is carried on. During the World War Czernowitz changed hands 6 times. The population is cosmopolitan consisting of Ruthenians Germans Rumanians Armenians Poles and Jews. Pop (1930) 111,000.

D

Dab, a small marine edible flat-fish, 9 or 10 in long, resembling a plaice

Dabchick, *see* GREBE

D'Abernon, Edgar Vincent, 1st Baron (b 1857), British diplomat. From 1883 to 1889 served as Financial Adviser to Egyptian Government. Made a baron, 1914, viscount, 1928. British Ambassador at Berlin 1920-6. He was concerned in the negotiations for the Dawes Plan, and he contributed towards the Locarno Pact. In 1928 he joined the Raccourse Betting Control Board. In 1929 he headed an economic mission to the Argentine to forward the interests of British trade.

Dacca, Indian district and town E of the lowest reaches of the Ganges. Though watered by several rivers, including the Brahmaputra, the district is not particularly fertile. In some parts good crops of rice are raised. There are undeveloped deposits of iron. Area, 2750 sq m, pop c 3,130,000. The town is one of the largest in Bengal, and is noted for jute manufacture, gold and silver work, and shell carving. The ruins of the ancient palace are interesting, and there are several schools and colleges. The muslin industry, for which it was at one time famous, has now declined. Pop (1931), 138,500.

Dace, a small freshwater fish allied to the roach, and frequently found in its company, but distinguishable by its longer body and the absence of red in the fins.

Dachshund, a dwarfed breed of dog of the true hound type, as shown by the shape of the head and long pendulous ears, but characterised by a long body and exceedingly short legs. Originally German in origin, it was bred for finding and marking badgers and foxes, whose burrows it is adapted

by its size to enter. In England it is kept solely as a pet or show dog.

Dacia, ancient Roman province, roughly corresponding to modern Rumania and Transylvania. Before its subjugation it possessed a considerable culture, and was several times unsuccessfully attacked by the Romans. It was finally subdued at the end of the 1st cent AD. In spite of attempts at colonisation the Roman hold on the country was never strong, and was overthrown without much difficulty by the Goths in the 3rd cent.

Dacoits (Hindustan, *dakait* = a robber), bands of Burmese who fled to the hills and jungle after the overthrow of Burma in 1886 and waged a desultory campaign against the British for several years. In the Penal Code *dacoity* is defined as organised banditry by 5 or more persons.

Dactyl, *see* VERSE

Daddy Long-legs, or *Crane-fly*, is a large gnat-like insect of the order Diptera (*see* FLIES). It is abundant in late summer and autumn in England, and is harmless in its adult condition, but its larva, which feeds on roots of grass and corn, sometimes devastating acres of pasture land, is a serious pest to farmers, who call it the "leather jacket".

Dædalus [DĒ'DŌLŪS], Greek mythical culture-hero, was the first maker of the axe, the wedge, and of sails for ships. In a fit of jealousy he murdered his nephew, who had invented the saw, and fled to Crete, where he designed and built the labyrinth in which the Minotaur was imprisoned. For the assistance which he rendered Pasiphaë (*qv*), he was incarcerated by Minos in the labyrinth, but escaped to Cumæ with his son Icarus (*qv*) by constructing wings of feathers and wax.

Daffodil, a bulbous herbaceous plant belonging to the family Amaryllidaceae found wild in many parts of England. The solitary yellow trumpet-shaped flower is enveloped in a membranous sheath borne near the apex of a hollow 2-edged stalk and

quell the natives at Calicut returning in 1493. He lived at Evora for 70 years when he was again dispatched on the same errand but died on his return journey at Cochín.

Dagenham Thames side Essex town including the Ford Motor

company works which provide much local employment. Smaller industries are the manufacture of bricks and tiles. Pop. (1931) 80,365.

Dagger a light short bladed hand weapon which has been used for hand-to-hand fighting and for murderous stabbing in all countries and at all periods. The medieval *misericorde* (1 ft and 13½ in) was used for striking between the links of heavy armour. A fine dagger or *poignard* was used with civil dress and a lighter form of the latter was known in Italy as the *stiletto*. A famous triangular dagger was made at Bayonne in the 16th cent. and de cloped into the *bayonet* (qv). The highlanders used to wear a d. k. in th. belt and a short *shea dhu* in their stocking.

Daggers are also common in the East where they are sometimes wavy like the Malayan *Aris* or curved like the Gurkha *Kukri* and often highly chased and decorated.

Daghestan, autonomous republic of the U.S.S.R. on the W coast of the Caspian Sea extending N to the Kalmuck area and W to Georgia. The surface is mainly mountainous and slopes W-E from the Caucasus Mountains to a narrow coastal plain. The N is comparatively arid steppe. Chief rivers are the Terek Sulak and Samur. Agriculture the chief industry exists through constant irrigation but the foothills give good grazing. During the Revolution the irrigation...



Daffodil

the leaves are sword shaped. Daffodils are among the most beautiful of spring flowers almost carpeting the ground of woodlands and orchards in March and April. Many beautiful varieties are cultivated under the name of *Narcissus*.

Da Gama Vasco (c. 1456-1524) Portuguese navigator. Discovered the sea route to India via the Cape of Good Hope. In 1497 he was sent by King Emanuel with three vessels to attempt the passage of the Cape. In spite of terrible difficulties he managed to reach Calicut returning to Portugal in 1499 when he was raised to the nobility. He was again sent out to

system fell into disrepair, and severe famine crippled Daghestan in 1921. Chief crops are fruit, tobacco, and cotton. Rich mineral deposits are being exploited increasingly, especially sulphur, cinnabar, and silver. Natural gas is being harnessed. The fishing industry has been re-established. The people, largely nomadic hillmen, include descendants of Huns, Avars, and other ancient races. The capital is Mahaek-Kala (Petrovsk). Area, c 22,000 sq m, pop 789,000.

Dago, a corruption of the Christian name Diego, applied contemptuously as a generic name to Spanish and Portuguese sailors, and later especially to Latin S Americans, or sometimes to all dark Latins, as opposed to blond Teutons.

Dagon [דָּאגוֹן], Philistine god, half man, half fish, is said to be the same as Dagan, a Babylonian deity.

Daguerre, Louis Jacques Mandé (1789-1851), French painter, gave his name to the "daguerreotype," the forerunner of the photograph. Niepce helped him to produce permanent pictures by means of sunlight, which he finally achieved by using an iodised silver plate. See also PHOTOGRAPHY and DAGUERREOTYPE.

Daguerreotype, the earliest process of photographic reproduction, so called after its inventor, Daguerre (see above). A copper plate, polished and silvered, was sensitised by exposure to iodine vapour, and so coated with a fine layer of silver iodide. It was then exposed in a camera as a plate is in the modern camera, though a much longer exposure was needed. It was afterwards removed and treated with mercury vapour, the mercury attaching itself to those portions which had been most exposed to light, and settling there in a density proportionate to the strength of the light. The unaffected portions were then cleared by immersion in a bath of hyposulphite of soda, or of potassium cyanide. The result was a brilliant picture, and the process was very widely used for portraiture,

though each picture necessitated a separate sitting.

Dahabiyeh [pron DAH'-HAH-BE'-Ū], a broad, shallow-draught vessel with sharp prow and sails, used for passenger-carrying on the Nile.

Dahlia [pron DĀL'-YŪ], a genus of plants belonging to the family Compositae, named after Dahl, a Swedish botanist. Dahlias were brought to Spain from Mexico in 1789 and thence spread over Europe as favourite perennial herbaceous plants for the flower garden. The plant has a marked inherent tendency to vary, and is very susceptible to cultural conditions, so that selection has resulted in a wide range of colours and of habit, size, and shape of the flower. There are large perennials and tiny annuals, single and double flowers, and heads several inches across or button-like. Any soil is suitable, and plants may be grown from seed, root-tubers, or cuttings.

Dahomey, colony in French W Africa. Bounded E by Nigeria and W by Togoland. Area, c 42,000 sq m, with 75 m of coastline. The French first settled on the coast in 1851, but it was not until 1894 that they annexed the whole of Dahomey. The capital is Porto Novo, and the chief port Kotonu.

The country is flat, with dense vegetation, but barren and undulating in the interior. The natives, who are of pure negro stock, are warlike and keen traders. The principal product is palm-oil, but maize, potatoes, oranges, limes, ground nuts, sugar cane, and papaws are also cultivated. Recently these have been supplemented by cotton. The chief exports are palm oil, kernels, and cotton, whilst imports are cotton goods, hardware, and iron. There are many excellent roads. The climate is hot and moist, with a long, dry season from Dec to March, and great rains from March to July. Tornadoes are not infrequent. Pop. (1931) 1,134,000.

Dail Eireann [pron DAWL ĀR'-ŪN], the Lower House of the legislature, I F S, forming, with the Senate and

the King the Irish Parliament under the Constitution of 1800. Its constitution and duties are similar to those of the British House of Commons, save that it consists of 153 members elected on the principle of Proportional Representation (see LECTURE ON SYSTEMS). It is officially bilingual both English and Irish being used for debates. It sits six years unless dissolved earlier.

Daimler Gottlieb (1844-1900) German inventor (1885) of a petrol-driven car upon which Benz Panhard and Lenoir based their engines.

Dairying The branch of agriculture concerned with the production of milk and its derivatives cream butter cheese etc.

The principal breeds of dairy cow (see CATTLE) are the S. Devon Lincoln Red Brit. sh. Irishian Dairy Shorthorn Devon Blue Albion Red Poll Ayrshire Guernsey Kerry and Dexter. The milk from the Jerseys and Guernseys has a higher butter fat content than the others, the average percentage content of butter fat in the milk of all the cows of the different breeds competing in the milking trial of the Dairy Shows and Royal Agricultural shows from 1903 to 1912 is given at the London National Milk Conference in 1912 as follows:

	Percentage Butter fat
Jerseys	4.70
Guernseys	4.63
Kerries	3.9
Devons	3.74
Dexters	3.83
S. Devon	3.61
Shorthorn	3.37
Red Polls	3.43
Ayrshires	3.40
Lincoln Reds	3.33
Friesians	3.47

The Jerseys and Guernseys are usually looked upon as butter cows while the Shorthorns Ayrshires S. Devons and Welsh are most used for cheese making. Where animals are wanted to combine milk producing qualities with production of meat and calves Shorthorns Red Polls S. Devons and Dexters are preferred. No breed perfectly serves the double

purpose but these are of considerable value in each capacity. The suitability of any particular breed depends on the locality, the soil, climate and available foodstuffs affect each breed differently and each has a limited area in which it reaches its maximum value.

The best dairy farms are those in which plenty of food can be grown cheaply to supply the cattle through the year and abundant water is available. The ideal land is a low lying rich pasture near a river or stream where the water level is near the surface and where a continuous supply of good grass and hay is available.

Food of dairy cow is rationed for two distinct purposes—(a) *Maintenance* and (b) *Production*.

The *Maintenance* ration is usually supplied by home-grown food. The following is an example of the rations given on farm in Kent during the winter of 1914-5.

	Estimated	Digestible Protein Equivalent
Jersey Heifer		
4 lb. sugar	2.40	0.14
10 lb. meadow hay	3.12	0.48
Total	5.52	0.62
Guernsey Heifer		
4 lb. sugar	2.15	0.16
11 lb. meadow hay	3.41	0.51
Total	5.56	0.67
Friesian Heifer		
22 lb.ilage	2.88	0.33
4 lb. oat straw	0.65	0.14
11 lb. meadow hay	3.41	0.50
Total	6.94	0.97
Shorthorn Heifer		
4 lb. mangold	2.80	0.16
10 lb. meadow hay	3.10	0.48
6 lb. oat straw	1.05	0.13
1 lb. red clover	0.60	0.18
Total	7.55	0.95

Production Ration. The arbitrarily chosen standard is a cow giving 10 lb. milk containing 3.7-3.8 per cent butter fat for which the prescribed

production ration is 2.50 lb starch equivalent, including 0.60 lb digestible protein equivalent. For richer milk, 0.5 lb starch equivalent, including 0.14 lb digestible protein equivalent, is added for every additional 1 per cent butter-fat. These figures are somewhat elastic, but any variation should not be more than 10 per cent in either direction.

The bulk of the food is an important consideration. Cows are ruminant animals and "chew the cud" but there must be a certain bulk of food in their first stomach, and for this reason dairy cows must always be given at



Cream Separator

least 16 lb of dry matter per day. Care must be taken, however, not to make the ration as a whole too bulky. The optimum quantity depends on the breed and on the individual, but a Shorthorn, for example, should not be given more than 34 lb of dry matter a day. If the milk production is high, more concentrated foods, such as bran and crushed oats, should replace straw and bulky roots and poor hay in the diet.

The maintenance ration of all the cows of a breed costs the same, while the cost of the production ration and the amount of milk are interdependent, so that the heavy milking cows are far

the most profitable. Cows should be graded by the amount of milk they produce and fed accordingly. It is waste to give a cow more food than she can utilise, but equally false economy to reduce the food of the heavy feeder who gives a proportionate quantity of milk.

The mineral requirements of cattle receive much more attention since the Ministry of Agriculture has encouraged systematic research. A gallon of milk contains rather more than 1 oz of minerals drawn from the blood-stream of the animal. It is not easy to replace this, because the amount of mineral substance eaten bears little relation to that absorbed, and because the presence of one mineral often interferes with the absorption of another. Deficiency of minerals, however, has serious effects. Calcium deficiency tends to production of weakly calves, miscarriage, or even sterility; phosphorus deficiency causes retarded growth and rickets in young animals, and a depraved appetite for earth, bones, etc.; chlorine lack leads to lustreless eyes and reduced appetite and milk yield; iron deficiency causes anaemia, an unhealthy condition of the liver, and susceptibility to certain diseases. Excess mineral is also detrimental. The calcium content of grass is high, and legumes, such as lucerne and clover, are rich in calcium. Powdered chalk is also valuable. Lucerne and seeds, hay and cereals contain much phosphate, and bone meal or steamed bone flour may be given.

Vitamins of milk are supplied from green pasture, and cabbages and other green food.

Breeding (see CATTLE) The milk record of each cow should be carefully kept, and cows selected for breeding who produce a steady flow of milk over a long period. The bull is also selected for milk-breeding qualities.

The most valuable property of a cow is the production of milk, not in large quantity on any one day, but in steady quantity over a long period.

the weight of milk given per day is therefore recorded for each cow

Milking is done steadily gently rapidly and thoroughly The cow must be approached carefully and handled gently or she may withhold her milk Stripping of the last drops of milk is essential because they are richest in butter fat and because otherwise the yield falls Milking requires skill and practice but an average hand can milk 7 cows in 5 or 6 minutes Milking is now often done by a pump 3 times a day Cleanliness is strictly observed in milking and the new milk is kept covered and cool to prevent bacterial infection Milk is sold direct or made into butter or cheese See also BUTTER CHEESE

Dairy Machinery see AGRICULTURAL MACHINERY

Daisy name of plants forming the genus *Bellis* (family Compositae) The common daisy is a well known weed found on lawns paths and flower beds with a rosette habit and ovate green leaves and white ray and yellow disc florets



Daisy

The ray florets are often tipped with crimson The daisy flowers nearly all the year round

Dakar capital and chief port of French W Africa in Senegal The harbour can accommodate large vessels and is important as a coaling station there is a small naval dockyard which also acts as a submarine base Pop (1931) 54 000

Dakin's Solution, a disinfectant solution containing sodium hypochlorite rendered neutral by adding boric acid as a buffer The disinfectant action

of this solution is very rapid but it has the disadvantage of being somewhat unstable and does not keep for more than about a week The amount of sodium hypochlorite present is about $\frac{1}{2}$ per cent See also ANTI SEPTICS BLEACHING

Dakota, North and South, see NORTH DAKOTA SOUTH DAKOTA

Dakotas, see RED INDIANS

Daladier Edouard (b 1884) French politician Minister for the Colonies under Herriot in 1924 of War under Poincaré in 1925 and of Public Instruction under Briand in Nov 1925 In 1927 he was elected President of the Radical Socialist Party He was chosen Premier for a term in 1931 and again in Jan 1932 when he held office for only 9 months He was an associate of Herriot and is an intellectual and anti clerical

Dalai Lama, one of the two Grand Lamas in the Lamaist (ge) form of Buddhism prevailing in Tibet The Grand Lamas are heads of monastic orders but they wield political power

Dalecarlia, or **Dalarne** (the Dales) Swedish region stretching from the Norwegian boundary to Gelle on the Baltic Now known as Kopparberg In the main the country is covered with forest but wherever possible agriculture is carried on The Dalesmen still retain the picturesque ancient costume and dialect The country contains some of the most valuable iron and copper mines in Sweden and is a favourite holiday resort The chief town is Falun Area c 11 500 sq m Pop c 250 000

Dalhousie 10th Earl and 1st Marquess of James Andrew Broun Ramsay (1812-1860) Governor General of India 1847-56—a period remarkable for the acquisition of territory and the improvement of internal administration Respecting the religion of the natives he contrived to introduce measures of social reform and to develop the natural resources of India During his viceroyalty occurred the second Sikh War in 1848 and the second Burmese War (1852)

the Punjab and Lower Burma were annexed to the British Empire

Dalkeith, Scots market town in Midlothian, between N and S Esk. An important grain market and agricultural centre. Its industries include brewing, brass founding, carpets, and brushes. Dalkeith Palace, built by Vanbrugh on the model of the Dutch Palace at Loo, and Dalhousie Castle are neighbouring attractions. Pop 7300

Dallas, large manufacturing city of Texas, USA on Trinity R., an important financial and commercial centre. The district is rich in cotton, wheat, maize, and fruit. There are oil-fields and petroleum refineries, whilst another important industry is printing and publishing. Pop (1930) 260,470

Dallmeyer, Johann Hein (1830-1883), German optician and maker of astronomical apparatus. He came to England in 1851 and entered a firm of lens makers, part of which he inherited in 1859. His improvements in lens making were notable, and he made instruments (telescopic and photographic) for the chief observatories of the world.

Dalmatia, coastal district of Yugoslavia along the Adriatic. It includes a large number of islands. There are three good harbours, Kotor, Split (or Spalato), and Dubrovnik. The climate is equable, agricultural produce is plentiful, grazing land good, and timber products valuable. Minerals are mainly iron, lignite, and salt. The chief industries are ship-building, lace-making, and the manufacture of maraschino. The pop is mainly Serbo-Croat and Italian. Dalmatia was held by the Romans, later by the Serbs and the Croats, and in the 15th cent by Venetians. Napoleon assigned it to Austria, and afterwards to Italy. The Congress of Vienna gave it to Austria. After the World War it voluntarily became part of Yugoslavia. Pop 625,000

Dalmatian, a large dog evidently of the Pointer type, supposed to have been introduced into England from

Dalmatia. It is characterised by its white coat covered with black spots, on account of which it was sometimes called "plum-pudding dog", but a better-known name was "carnage dog," derived from the fashion, prevalent even in Victorian times, of keeping one or more of these dogs to accompany the equipages of the aristocracy. Originally they were used as watchdogs.

Dalmatic, a sleeveless embroidered vestment worn by deacons in the Roman Church and the High Church section of the Anglican Church during the celebration of High Mass and at processions. It is also worn by bishops beneath the chasuble. It was formerly adopted by the Holy Roman Emperors, and still forms part of the English coronation robes.

Dalton, John (1766-1844), English chemist, born in Cumberland. He conducted important investigations on the nature of colour-blindness, from which he suffered. His chief researches were on gases and vapours, from which he developed his "Atomic Theory" explaining the laws of chemical combination.

Dalton-in-Furness, market town, Lancashire, 4 m from Barrow-in-Furness, producing iron ore and limestone. Furness Abbey is within easy reach. Pop (1931) 10,338

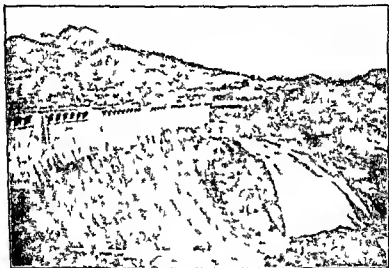
Dalton's Laws. The first, the *Law of Partial Pressure*, states that, in a mixture of gases, each gas exerts the same pressure as it would if it occupied the total volume, i.e. that the total pressure of the mixture is equal to the sum of the partial pressures of each gas. The second law, often called *Dalton's Law*, is that, if a mixture of gases is in contact with a solvent, the combined amounts of solvent and each dissolved gas are in proportion to the partial pressure of the particular gas.

Daly, John Augustin (1838-1899), American playwright and theatrical manager, born at Plymouth, N. Carolina. Discovered some of America's best-known actors. He opened Daly's Theatre, New York, in

1879 and Daly's Theatre London in 1893. At the latter in 1896 he produced *The Griska* the first of a long series of famous musical comedies presented at his theatre. Several of his own plays were temporary successes.

Dam, a wall of earth masonry or concrete usually built with a view to impounding water in a valley for purposes of water supply irrigation or the development of hydro-electric

carried down to rock or other impermeable strata. The puddle clay which is clay which has been exposed to the air and then watered and mixed to a plastic mass in a pugging mill is then deposited in the trench in layers of about 6 in. thickness and is worked into position with special tools. When the trench has been filled up to existing ground level construction of the core and the earthwork is proceeded with simultaneously. The clay is plastic



The Li Yu Dam in Siam

power. The commonest form used where the height does not exceed 100 ft. is the earth dam which consists of a central core of puddle clay supported on either side by earth. In the construction of such a dam the whole site is first cleared of undergrowth and top soil and any loose pockets of soft earth are removed and the holes left are filled up with puddle clay. Along the longitudinal axis of the dam a trench is then dug to take the puddle clay core. It is important that this trench which may be 3 or 4 ft. wide should be

and needs support and it must not therefore be carried up higher than 12 in. above the earth embankment. The earthwork is laid in layers which slope inwards to the core at a slope of 1 1/2 to the layers being about 8 in. thick at the core face. The earthwork should be frequently rolled in two directions by 3 ton rollers. The side slopes are generally made 3 1/2 on the water face and 2 1/2 on the downstream face. The water face must be stone-pitched to resist wave action and the downstream face is usually sown with

some coarse-growing grass to act as a bind. It is most important that no water should be allowed to flow over the downstream face except over a properly constructed spillway. The outlet to a reservoir impounded by an earth dam may be either through a pipe passing under the dam or through one taken round the end of the dam through the rock or side of the valley. The latter method is probably more satisfactory, but the question is usually settled by local circumstances.

If the height of a dam is more than 100 ft., it is invariably constructed of masonry or concrete. Masonry dams are generally of the gravity type, that is to say, the water pressure is resisted entirely by the weight of the dam. The cross-sections of gravity dams vary somewhat in different examples, the water face may be vertical or it may have a slight batter, but in general principle they are always triangular in shape. Masonry dams must be carried down to rock or some very firm foundation, and this may often entail foundations of very great depth. In the construction of a masonry dam of great length it is the practice to build up a number of sections, equally spaced along the dam, to the full height. A light railway is then laid along the top of the sections and is roughly bridged with timber over the gaps. The spaces are then filled up with materials lowered by cranes from the railway. The advantage of this method is the saving of time and labour which would be required in continually raising the constructional railway if the dam has brought up evenly along the whole length. The sections may either be keyed into one another or the sides may be finished off smooth, leaving a narrow gap between the sections. The gap will eventually be grouted up with fine cement concrete, forced in under high pressure. During construction some means must be provided for diverting the stream or river. If the final outlet to the reservoir is to be at one end of the dam, then it will prob-

ably be best to construct this first and to divert the stream through it while the dam is in course of building. If the outlet is to be central, then a temporary conduit must be provided. In the case of a dam such as the Aswan Dam in Egypt, used for irrigation purposes, the water is regulated by a series of sluice gates in the dam itself. Provision must always be made in dam for overflow. In the Vyrnwy Dam, Wales, the water spills over the top of the dam and runs down the lower face. In such a case the lower face should be stepped to break the fall of the water. The more usual method is to arrange for a weir or spillway at one end or the middle of the dam. A masonry or concrete spillway must always be adopted in the case of earth dams.

Arched dams are occasionally constructed, more frequently since the introduction of large-scale reinforced-concrete work. In such a dam the horizontal water pressure is resisted by an arch, the abutments of which are embedded in the rocky sides of the valley. Provided suitable abutment resistance can be obtained, the form of the arched dam is ideal since its resistance is independent of its mass. If the dam is of concrete the cost of curved or spherical shuttering is an item which must receive careful attention.

Damages, in law, the compensation recoverable by a person who has suffered a legal wrong. They are awarded on the principle that the plaintiff is, so far as money can secure this, to be placed in the same situation as if the wrong had not occurred. General damages are those presumed to result naturally from the act; special damages are given for a specific loss. Nominal damages are awarded where no actual damage has resulted. Exemplary or vindictive damages are given where it is intended to punish the defendant, especially in cases of defamation, and contemptuous damages where the plaintiff does not deserve to recover anything, though legally he is entitled to damages.

Daman (or *Damao*) Port Porto guese India and capital of Settlement of Daman (8th sq m) Tobacco wheat and rice are cultivated and there are valuable teak forests There is no export trade but some local industries include weaving basket making and fishing Pop c 60 000

Damaraland (or *Hereroland*) monotonous S W African region extending inland from the Atlantic Ocean to the kalahari and bordered on N and S by Ovampoland and Namaqualand Stock raising is carried on and products include ivory and skins Windhoek the capital of S W Africa is here and the only harbour is Walvis Bay

Damascening see ART TERMS GLOSSARY OF

Damascus capital of Syria situated on the R Barada and perhaps the most ancient inhabited city in the world It is mentioned in Genesis and frequently in other parts of the Bible The modern town is exceedingly picturesque with its mosques bazaars and mixture of races and lies in a fertile and well watered district Its buildings illustrate its varied history and there are Roman walls and gateways The Great Mosque originally built as a Christian church in the 4th cent was rebuilt in the 8th The most famous street is called Straight Successive plunderings rebuildings and a number of disastrous fires have robbed the city of much of its archaeological interest Damascus has always been famous for its metal and filigree work and inlaid swords Embroidered goods leather and jewellery are still traded and it remains a great caravan and transport centre

Its history is a story of warfare It has seen David's expedition against it its possess on by Israel its conquest by Alexander the Great the Roman period its conquest by the Moslems in 633 after a siege the complicated relations with the Crusaders and the final Turkish conquest in the early 16th cent which kept it Ottoman until 1918 During the World War it was

a base for German and Turkish troops and later (1918) was occupied by Lord Allenby and King Feisal For some years after the War there was considerable friction with the French whose influence was established by the Treaty of Versailles For the history of this see SYRIA Pop 184 000

Damask, material of silk linen etc with a raised or flat pattern woven into it and shading alternately light and dark, according to the angle of view The name is derived from Damascus (q v) whose 17th-cent silken fabrics were so renowned that every patterned textile resembling them wherever made was called damask Linen damask is used for tablecloths the cheaper varieties being woven of cotton Silk damask is used for curtains and upholstery

Damask Steel is steel originally made in Damascus with a pattern of wavy lines **Damask Rose** a pink rose originally grown in Damascus

Damasus, name of two popes

DAMASUS I born in Portugal was Pope from 366-84 He is recognised as a saint (feast day Dec 11) He interested himself in the preservation of the catacombs and the tombs of the martyrs and had them inscribed with verses written by himself He gave Jerome (q v) the task of preparing the Vulgate version of the Bible

DAMASUS II reigned from July to Aug 1048

Damien, Father Joseph (1810-1890) Belgian missionary His secular name was J de Veuster He devoted himself to the cause of the lepers of Hawaii and ultimately died of leprosy in Molokai A gratuitous attack upon him was rebutted by R L Stevenson in a pamphlet published in 1890

Damietta, Egyptian town near the mouth of the Nile at the N end of Lake Menzala It is of little significance to-day though there are several fine mosques but at the time of the Crusades (q v) it was one of the most important Egyptian cities and was held by Louis IX of France in the middle of the 13th cent Dan

was once noted for the manufacture of dimity cloth, which acquired its name from the town Pop 35,000

Dammar Gum (or *Resin*), a naturally occurring gum obtained from coniferous trees that grow in the East, mainly the E Indies and the Philippines. Dammar gum is soluble in turpentine, alcohol, and ether, and is employed in the manufacture of lacquers and varnishes.

Damocles [DAM'ŪKLEZ], a sycophant of the Court of Dionysius, tyrant of Syracuse. He continually flattered the monarch, calling him the happiest man in the world. In order to show him the cares of a sovereign, Dionysius caused him to sit upon the throne at a feast of unparalleled splendour. Damocles gazed in delight upon the scene until, looking up, he perceived a sword hanging point-downwards directly over his head, suspended by a hair only. This symbol convinced him of the dangers of kingship, and the phrase *the sword of Damocles* has become proverbial.

Damon and Pythias, two friends who lived at Syracuse. One of them (accounts vary as to which) was condemned to death by Dionysius, and was granted a short delay while he arranged his affairs, his friend offering himself as surety for his return. The second was about to undergo execution in his friend's place, when the condemned man returned. The tyrant was so struck by this devotion that he pardoned him and begged to be allowed to make a third in the friendship. Pythias is also known as Phintias.

Dampier, William (1652-1715), English navigator and adventurer, sent in 1699 to explore the coast of Australia and New Guinea, where he gave his name to the Dampier Strait and Archipelago. He was wrecked on Ascension Island for 2 months, but was picked up with his crew. His reputation was damaged by his brutality. He piloted the privateer which rescued Alexander Selkirk.

Damson, a deciduous tree which is a species of prunus related to the plum,

grown for its edible fruits, which are smaller than the plum and sharper and usually cooked or preserved.

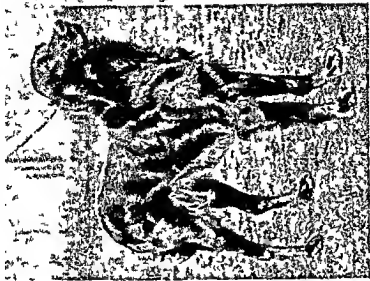
Dan, regarded in Scriptural times as the most N town of Palestine, and frequently mentioned in the Bible. The mound Tell-el-Kadhi, whence issue one of the sources of the Jordan, is believed to occupy the site of the city which it is proposed to excavate. Under the earlier name of Leshem it was a dependency of Sidon.

Dana, Charles Anderson (1810-1897), American journalist. He was store-clerk until 1837, then was educated at Harvard from 1839 to 1841. Five years later, he joined the *New York Tribune*, and visited Europe as its special correspondent in 1848. From 1849 to 1862 he was its managing editor, adopting an anti-slavery programme. During the Civil War he accompanied the forces, reporting to the Secretary of War any delinquencies or mistakes made by the commanders. This led to his appointment as Assistant Secretary for War (1864-5). In 1868 he was appointed Editor of the *New York Sun*, a post he retained until his death and co-editor of the *American Cyclopaedia*. His works include *The Art of Newspaper Making* (1900), *Reminiscences of the Civil War* (1895).

Danae [DA'Æ], daughter of Acrisius, gave birth to Perseus (qv.) as the result of a visit from Zeus (qv.) in the form of a shower of gold.

Danaus [DA'ΛŪS], mythical founder of Argos, was the father of the fifty *Danaides* [DANĀ'IDĒS], who all, except one, Hypermnestra, slew their husbands (the fifty sons of Ægyptus) on their nuptial night, at the command of Danaus. For this crime the forty-nine murderers were condemned to Hades, there for ever to pour water into vessels that were full of holes.

Dance of Death (or *Danse Macabre*), an allegorical representation of the power of death over man. It was first presented as a Church play c. the 14th cent., with music and dancing, and dialogues between Death and men of



(7) IRISH SETTER



DOGS (8) BULLDOG

various rank. Most European countries had their own adaptations. Pictures have been painted on this subject and Saint Saëns wrote descriptive music on the theme.

Dancing the art of performing graceful and rhythmical motions of the limbs and body usually with a musical accompaniment. Primitive dances of very early times were closely connected with religious or magic ritual and frequently imitated the actions of warfare or the chase or the movements of animals. Religious dancing frequently excited its devotees to frenzy as with the orgiastic cults of Bacchus and Cybele. A revival of dancing as an art or pastime began in Italy in the 15th cent. but modern ball room dancing developed mainly in France during the 16th and 17th cent. when national dances from many countries were improved and adapted for the use of Society. Dances in vogue during this period included the *Faune* a stately processional movement of Spanish origin, usually accompanied by song, the *Saband* and the *Seguidilla* both borrowed from Spain and the *Cowale* a courtly dance with many bows and curtseys from which both the minuet and the valse are partly derived.

The *Minuet* brought to Paris c. 1630 reached its greatest popularity in the reign of Louis XV. It combined gracefulness with ceremonious formality. The *Gavotte* another stately and ceremonious dance like the minuet later developed into a stage dance too elaborate for performance in the ball room. Other famous Spanish dances are the *Fandango* a lively movement accompanied by the chatter of castanets, snapping of fingers, and much stamping and the *Haleco* a slow gliding step with much waving of the arms. The *Can-can* is a graceful dance marked by movements of the head and shoulders. The *Jota* the national dance of Aragon, has continued to be a religious dance.

English ball room dancing was derived originally from France and now

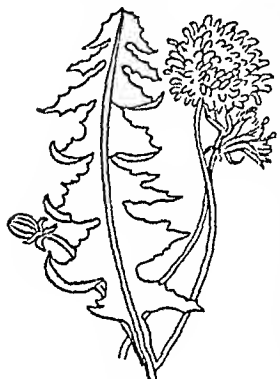
derives mainly from the U.S.A. but England is rich in traditional dances which survive only in children's games but which the English Folk Dance Society has done much to revive and preserve.

The national dances of Scotland are *Strathspeys*, *Reels* and *Flings* still steeped out with enthusiasm by patriotic Scots. The jig is Ireland's only national dance but is capable of infinite variations. The birthplace of the *Waltz* or *lalse* is uncertain. It was introduced into France from Germany in 1795 and reached England in 1810 and with various modifications has retained its popularity up to the present day. The *Quadrille* a square dance for 4 couples was first danced in England in 1818 but was superseded soon after 1850 by the *Lancers* popular up to 1910 and still occasionally danced. The *Polka* a lively Bohemian dance adopted by French dancing Society in 1840 soon became immensely popular. Several attempts to revive it have been made recently. English country dances were introduced into France (corrupted to *contre-danses*) early in the 19th cent. *St. Roger de Cœury* in which two lines of dancers face one another and dance in pairs down the middle is the only survivor. Towards the end of the 19th cent. England began to turn to America for ball room steps. These included the *Cakewalk* a dance of negro origin and the *Washington Foxtrot* both of which were short lived also the *Harlem Dance* which is still occasionally seen. The *Tango* Spanish American was introduced c. 1913 but proved too elaborate for English ball rooms. A recent attempt at revival has been a little more successful. The *Boston* a variation of the valse danced in very slow time against the rhythm of the music and with some additional steps was popular c. 1910-14. The years immediately following the World War saw an unprecedented boom in ball room dancing which has become much less formal. Principal dances were the *foxtrot*, the *Onstep* and

several variations of the *Waltz*. The music of foxtrot and onestep is known as *Jazz* (*qv*), imported from the U.S.A., and obviously based on primitive negro music. All these dances, including the modern waltz, are characterised by great variety in their steps and the method of dancing. Attempts to introduce new dances, such as the *Blues* and a modified form of *Tango*, have not had much success, and there is now a tendency to revive old Victorian favourites, the *Polka* and the *Lancers*.

See also **BALLET**

Dandelion (from the French *Dent-de-*



Dandelion

lion's tooth), a plant of family Compositae. It has deeply cut leaves which all spring from the root and the lobes of which all point backwards and hollow, smooth, leafless flower-stalks, each bearing a single flower-head, the heads when in fruit are of a globular form. The dandelion, a perennial, flowers nearly all the year round, and the young leaves are a useful salad ingredient.

Dandolo, famous Venetian family. **ENRICO DANDOLO** (c 1110-1205), doge of Venice, 1192, subdued Dalmatia, headed a Crusade to Constantinople, and overthrew the Emperor Alexius, 1203. As a result of Venetian participation, Crete and many other islands in the Levant were ceded to Venice. Three other members were doges. **ANDREA DANDOLO**, ruled 1343-54, won fame as jurist and historian.

Dane, Clemence (*Winifred Ashton*) English novelist and playwright. Among her plays are *A Bill of Divorcement* (1921), *Will Shakespeare* (1921) and *Wild Decembers*, (1933), about the Brontë family.

Danegeld, a tax first levied by Ethelred II, the purpose of which was to raise money to buy off the Danes and prevent their periodic invasions of England in the later part of the 10th cent. Danegeld was levied until A.D. 1163, but in the 11th and 12th cents it was used as a convenient tax, not as the price of security.

Danelaw, the part of England settled by the Danes, which formed an independent kingdom in the latter part of the 9th cent. It included Essex, E Anglia, Lincolnshire, Yorkshire, and the E Midlands. The boundary line was settled in 878, when Alfred the Great drove the Danes out of Wessex. The district was gradually reconquered in the 10th cent. Danish influence is still traceable in place-names and local dialect.

Dangerous Trades, undertakings in which the risk to the worker of physical harm or hurt is greater than normal. The danger may be from sudden accident, as in coal-mining or the care of machinery, or more commonly from slow poisoning or degeneration caused by the nature of the materials dealt with. Accidents in mines and factories have long been notifiable to the Chief Inspector of Factories, the Factory and Workshop Act of 1901 added various kinds of poisoning and anthrax. One of the most common dangers is lead poisoning, caused by inhalation of fumes from smelting, or of dust by white-lead workers, house decorators, and pottery-glazers. Mercurial poisoning is frequent in the making of scientific instruments, carbon-bisulphide poisoning in rubber and artificial-silk manufacture, and anthrax in bale-breaking in the wool industry. In coal-mining the hazards are due to explosions, falls of stone, etc., which cause an annual death-rate of c 1 per 1000 miners in the U Kingdom,

In the cotton industry the damp atmosphere dust and heat produce a heavy toll of bronchitis and tuberculosis

Daniel, Hebrew prophet the central figure of the biblical book of that name probably composed by a Hebrew writer c 180 B.C. Daniel was one of the Jews taken to Babylon at the Captivity and rose to a high position at the Courts of Nebuchadnezzar Darius and Cyrus. Research has proved that the book is legendary rather than historical. The chronology is confused but Daniel is set in a 3rd cent. B.C. background.

Daniell John Frederic (1790-1840) first Professor of Chemistry at King's College London. He invented the Daniell cell a primary battery still used in some telegraphic work. He invented also the dew point hygrometer and the recording pyrometer. In 1830 he was awarded the Copley medal. His most important publication was *An Introduction to Chemical Philosophy*.

Daniels, Josephus (b 186) American editor and Democratic politician. He was chief clerk of the Department of the Interior from 1893-6. In 1913 he became Secretary of the Navy under President Wilson of whom he wrote *a Life* (pub 1924).

Danish Language and Literature see SCANDINAVIAN LANGUAGES and SCANDINAVIAN LITERATURE

D'Annunzio, Gabriele, see ANNUNZIO GABRIELE D'ITALIAN LITERATURE

Dante Alighieri (1265-1321) the great Italian poet. Little is known of his early youth except that he was already writing poetry at the age of 18. His earliest great work was the *Vita Nuova* containing the history of his love for Beatrice the inspiration of nearly all his work whom he says he met at the age of 9. Little is known of her and it cannot be said that she returned Dante's love. The *Vita Nuova* is written in the form of lyrics set in a prose narrative and was probably finished in 1293. Guido Cavalcanti the great lyric poet of his day was a close friend of Dante and

probably had much influence on the young writer's poetic form.

Dante lived in times that were full of trouble for the Florentine Republic. He probably took part in the Battle of Campaldino against the Ghibelline cities of Pisa and Arezzo in 1289. Soon after the death of Beatrice in 1290 he married Gemma Donati the daughter of a powerful Guelph family and by her he had 4 children although he never seems to have seen her again after the beginning of his exile. Soon after Boniface VIII was made pope Dante entered upon political life and being entangled in factional intrigues was exiled from Florence c 1303. He died in exile at Ravenna in 1321 disappointed in his hope of seeing a united Italy.

It is difficult to date his works exactly. They fall into three main periods—the youth

ful period of the *Vita Nuova* the second period of political and philosophical activity when the *Convito* the *De Vulgari Eloquentia* and the *Canzoniere* were written and the magnificent period of maturity which produced the great *Divina Commedia*.

The *Canzoniere* include all Dante's lyric poems those on his love for a real Beatrice on his adoration of an ideal woman still called Beatrice on his love for other women and those on the abstractions of Nobility and Virtue. His Latin prose works attempt to deal idealistically with the knotty problems of medieval politics.

But it is upon the *Divina Commedia* that his fame principally rests. Its composition probably covers the



Dante

period between 1311 and 1321. The poet describes a vision of the life of man after death, placing himself in the year 1300, and writing of subsequent events as one who is foretelling them. The whole poem, divided into the three parts of the *Inferno*, *Purgatorio*, and *Paradiso*, is an allegory of the life and destiny of man, described by a great scholar in an age of brilliant culture and free thought. Vergil, sent by the Blessed Virgin, Beatrice, and St. Lucy guides the straying poet through Hell and Purgatory, where he meets and describes the popes and warriors and kings of this world. Then Beatrice appears to lead the poet to Paradise, where in one final flash of light he understands the will of God, and there the poem ends.

Apart from his absolute literary importance, Dante, by using the vernacular Italian for his greatest works, had a large influence upon the formation of Italian as a literary language.

Danton, Georges Jacques (1759-

1794), French revolutionary leader, with Marat and Desmoulins founded the Cordeliers Club in 1789, and in 1790 was made a commander of the National Guard. He became



Danton

Minister of Justice in 1792. His vigorous eloquence saved Paris from panic when the Prussians were advancing. He denounced the September Massacres, but voted for the death of the King, and was a member of the Committee of Public Safety. He crushed the Girondists in 1793, and tried to unite France against the enemy, but his party of extremists forsook him for Robespierre, and in 1794 he was arrested, summarily condemned, and executed with 14 others on the day after his arrest.

Danube (Ger. *Donau*), one of the most important of European rivers and second only to the Volga in length (1770 m). It rises in the Black Forest. Its course from the Black Forest generally E as it passes into Austria through Vienna, having been fed thus first part of its course by the Ill, Isar, and Inn. Continuing E forms for some distance the Czechoslovakian-Hungarian frontier before turning S above Budapest and flowing across Hungary. In the S of the Hungarian Plain it is joined by the Drava and turns E again to flow through a mighty valley between the Low Carpathians and the Dinaric Alps. From the Drave to the Iron Gates its chief tributaries are the Save, Tisza and Morava. The Iron Gates are at the E end of a wild and rocky territory where the Carpathians extend across the Transylvanian Alps, towards the Balkan Mountains.

Having crossed the Hungarian Plain, it passed SE through the NE corner of Yugoslavia and along the Rumanian border for some 30 m beyond the Iron Gates, it reaches the Rumanian-Bulgarian frontier and the Walachian Plain. Here it makes a final detour N and then E to its delta on the Black Sea. Important tributaries between the Iron Gates and the delta include the Oltul, Dambovitza, Sereth, and Pruth.

The Danube is remarkable for the number of important towns on its banks, e.g. Ulm, Regensburg, Passau, Linz, Vienna, Bratislava (Pressburg), Budapest, Belgrade, Rustchuk, Braila (up to which port sea-going ships can pass), Galatz, and Ismail. Throughout most of its course on the Rumanian border it is flanked by innumerable lakes, and its delta is a great swampy area upwards of 1000 sq m in extent.

The Danube is of great commercial importance, and for more than half a century has been administered by a European Commission. Before the World War this consisted of representatives of the interested countries, whose authority extended only to the Delta. by the Treaty of Versailles a new Com-

mission was established consisting of representatives of Great Britain France Italy and Rumania though any State able to prove sufficient commercial interest was entitled to admittance. This new authority only deals with the river up to Braila the upper navigable sections being administered by an International Commission who have given free access to ships of all nations.

There are two notable canal systems the Ludwigs Canal now being extended and improved which connects the Danube with the Main and the Moldau and Muhl Canals which connect it to the Elbe. The total area drained by the river is some 3 5000 sq m.

Danzig, free city situated near the mouth of the Vistula between the NW extension of Poland and E Prussia on the Gulf of Danzig. The freedom of Danzig and its surrounding district comprising in all some 730 sq m was established under the League of Nations in 1919 as one of the articles of the Treaty of Versailles. It forms with Poland a single Customs territory.

Danzig has always been a large commercial and shipping centre from its favoured position, and exports timber grain flour iron and sugar from Poland Germany and the Ukraine. Local industries include shipbuilding engineering brewing and tobacco factories. The docks and harbour works are considerable and efficient. Imports which supply the surrounding district are mainly coal fish iron and general foodstuffs. The harbour is administered by a council composed of Poles and Danzig nominees presided over by a Swiss appointed by the League of Nations.

Part of the town has retained its ancient buildings a number of the houses belonging to the great merchant days of the Middle Ages. The 14th-century church, town hall and picture gallery are of some architectural importance.

Danzig a notable port since the

10th cent. has been in turn Prussian Polish and French (1807-13). It was restored to Prussia after the Napoleonic Wars (1814) and remained the capital of W Prussia until after the World War. Standing at the head of the Polish Corridor (q.v.) it has become an acute problem for politicians and a lasting grievance to Germany. In 1933 a strong majority of Nazis (German National Socialist) members were elected to the Diet and a tense situation arose in consequence. Pop. (including locality) 410 000.

Daphne, or *Spurge Laurel* a low shrub c. 2 ft high with few branches remarkable for its smooth erect stems which are bare of leaves except at the summit. The leaves are smooth shining and evergreen. The flowers are green and fragrant in damp weather. The berries are black egg-shaped and poisonous. The plant is not infrequent in woods and is used as a stock on which to graft *Daphne Indica* a plant commonly cultivated in conservatories and gardens for the fragrance of its flowers.

Daphne (Gr. myth.) goddess beloved by Apollo. Pursued by him she prayed for aid to her father Peneus who changed her into a laurel tree. Apollo thereupon ordained that the tree should be sacred to him and thereafter wore a wreath of laurel.

Daphnis, legendary Sicilian shepherd the son of Mercury and the supposed originator of pastoral poetry. He was taught the art of playing on the pipe by Pan and of composing verse by the Muses. His name is often given to characters in pastoral verse.

D Aranyi, Jelly (b. 1893) Hungarian violinist born at Budapest a grand-niece of Joseph Joachim and sister of Adila Fachur, also a violinist. She studied under Hubay and is now internationally recognised as a first-rate interpreter of classical music.

Darbhanga, Indian district and its capital. The district is within the province of Bihar and Orissa and stretches between Nepal and the Ganges. Watered by several rivers it

produces good crops of rice, tobacco, and sugar. The town stands on the Little Bagmati R., and trades in the local produce. Area, 3350 sq. m., pop. district c. 3,000,000. town 51,600.

D'Arblay, Madame, see BURNES, FANNY.

Darby and Joan, proverbial names for happy, elderly married couples. They first figured in a ballad which appeared in the *Gentleman's Magazine* (1735). Darby is supposed to have been a printer, to whom the son of the author of the ballad, Henry Woodfall, was apprenticed.

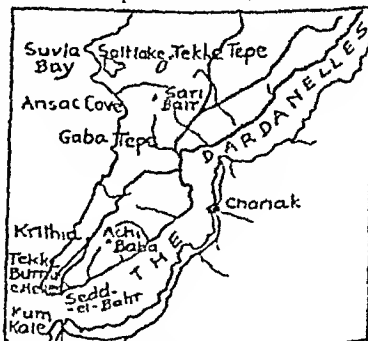
D'Arcy, Chas. Fredk. (b. 1859), Protestant Archbishop of Armagh, born in Dublin. Ordained 1884, was Vicar and Dean of Belfast (1900-3), and has received many academic honours and appointments. Successively Bishop of Clogher (1903-7), Ossory (1907-11), Down and Connor (1911-19). He became Archbishop of Dublin (1919-20) and Primate of All Ireland in 1920. He has published several works, which include *A Short Study of Ethics* (2nd ed. 1901), *Christian Ethics and Modern Thought* (1912), *Science and Creation* (1925), and *God in Science* (1931).

Dardanelles (Turk. *Bahr-Sefed Boghazi*), strait between Gallipoli and Asia Minor, connecting the Aegean with the Sea of Marmora. It is of great strategic importance, and was the seat of operations against Turkey in the World War, after which by the Lausanne Treaty (1923) it was demilitarised. The Dardanelles takes its name from the ancient city of Dardanus in the Troad. The strait, known in antiquity as the *Hellespont*, was the scene of the legend of Hero and Leander. In 480 B.C. Xerxes crossed the Hellespont over a bridge of boats, on his way to Greece. The strait is c. 45 m. long and 3-4 m. wide, it was swum by Byron.

Dardanelles, Treaty of, or *Treaty of London* (1841), between England, France, Prussia, Russia, and Turkey. It was signed at London confirming

the Convention of 1840, limiting Mehemet Ali to Egypt and Acre; and closing the Dardanelles to all ships of war unless, with the consent of the Sultan. The Dardanelles clauses were abrogated by the Treaty of Sevres (1920), which, *inter alia*, internationalised the Straits.

Dardanelles Campaign, begun by the Allies in 1915 to establish communication during the World War between the Mediterranean and Russia. Heralded by an abortive naval attack on the Straits, the land campaign failed completely to achieve its aim. It was marked by great heroism among the troops, missed opportunities, and a masterly execution. Under Sir Ian Hamilton, landings were made in April 1915 at Cape Helles, Kum Kale, and a small bay known as Anzac Cove. At Cape Helles a landing was effected at great cost, but little advance could be made in the face of strenuous Turkish opposition. The French landed in the teeth of great opposition at Kum Kale, but withdrew the next day and reinforced the divisions at Cape Helles. But the most



The Theatre of Operations

famous episode is the landing at Anzac Cove, where, though the Turks were weak, operations were made difficult by its exposed position and by the lack of water. By July 1915 the position was stalemate, small gains had been made, and the Allied line at

Cape Helles had been pushed forward to Krithia. The Allied forces were nowhere occupying commanding positions. Reinforcements were sent out and Hamilton determined to make a surprise landing at Suvla Bay and at the same time attack the hills of Sari Bair with the forces at Anzac Cove from which position the Narrows could be dominated. The landing at Suvla Bay was marred by procrastination. Although it was some time before an adequate attempt to oppose them could be made by the Turks the English forces failed to occupy the most suitable positions. The attack on Sari Bair from Anzac was also a failure owing to stubborn Turkish resistance. After great hesitation the British Government decided on evacuation. The troops at Suvla Bay and Anzac were evacuated 10 Dec 1915 without the Turks being aware of it a difficult operation which was carried out without a casualty or loss of war material. The evacuation of Cape Helles even more difficult because the Turks were on their guard was carried out successfully in Jan 1916. See also GALLIPOLI.

Dar es Salaam, capital and chief port of Tanganyika Territory. It lies at the terminus of the railway to Lake Tanganyika and conducts the import and export trade for much of the country. The harbour is sheltered and well equipped. Both town and harbour were laid out by Germans as the town was the Government centre of German E. Africa before the World War. Pop. (1931) 33 150.

Barfar semi-independent province of Anglo-Egyptian Sudan. It lies in the S.W. and consists mainly of a high well forested plateau with several ranges of hills. On their slopes cereals, tobacco, cotton and vegetables are grown, cattle and camels reared and the main exports are gum, ivory and ostrich feathers. The natives are negroes and Arabs. Administration is carried on by the Sultan from L.L. Fasher under British influence. The country fell to the Egyptians in

the 19th cent. later to the Mahdi and finally to the British who restored the native Sultan. Cap. El Fasher. Area 150 000 sq. m. pop. c. 850 000.

Darien, district in the E. of Panama site of the first settlements intended to control the isthmus which was early recognised as the key situation for trade with the Pacific. It was discovered by the Spaniards. In 1690 a Scottish trading company was formed under the leadership of William Paterson the economist with the object of controlling trade across the Isthmus and founding the settlement of New Caledonia. In 1698 the colonists left Letha for Darien. The project failed probably partly owing to the hardships of the life there and partly to Spanish opposition though the Scots put down the failure to English trade rivalry.

Darius name of three kings of Persia. **DARIUS I** (c. 518-485 B.C.) succeeded Cambyses. He reorganised the Persian Empire and consolidated its frontiers. In 513 B.C. he crossed the Bosphorus and led an army against the Scythians. The revolt of the Greek cities of Asia Minor (Ionian Revolt) caused Darius to undertake the first Persian invasion of Greece c. 490 in which the Persians were defeated at Marathon (q.v.).

DARIUS II (424-405 B.C.) His reign was marked by confusion and misrule.

DARIUS III (336-331 B.C.) Spent his reign in a vain struggle with Alexander the Great who defeated him at Issus and Arbela and brought the Persian Empire to an end.

Darjeeling town and small district of N. Bengal between Bhutan and Nepal. It lies among the lower slopes of the Himalayas and the scenery is magnificent both Everest and Kanchenjunga can be seen from the higher points of the district. Agriculture is the main occupation and tea the chief crop. The natives are Bengalis and Nepalese. The town is the summer residence of the Bengal Government.

The climate is healthy, though wet, and the town is well laid out, with spacious public buildings, including several colleges and schools. Area, 1160 sq m, pop district 283,000, town 22,250.

Dark Ages, The, the five or six centuries following the fall of the W Roman Empire, after the civilisation of Rome, based on unity and inter-communication, had been destroyed by repeated barbarian invasions.

The 3rd cent A D was for the Roman Empire a period of continual civil wars and barbarian invasions. These resulted in the loss of the province of Dacia, and split up the Empire amongst the various candidates for the Imperial throne. The Empire was reunited under Aurelian, and the administrative reforms introduced by Diocletian and Constantine the Great stayed off the downfall for a time. After the death of Constantine the empire was alternately divided and reunited (see BYZANTINE EMPIRE). The E or Byzantine Empire lasted until 1453, the W Empire was extinguished in 476.

During the 4th cent the W Empire held its own against barbarian attacks, but in the 5th cent the latter brought about the fall of Rome. The invasion came from barbarian tribes already settled within the confines of the Empire, as well as from those of N Germany. Alaric led the Visigoths settled in the Danube provinces into Italy, and sacked Rome A D 410. The Vandals conquered the province of Africa and the Visigoths divided Spain with the Suevi. In 451 Gaul was invaded by Attila and his Huns (qv). Attila was king of a barbarian Empire in N Europe, and threatened by his strength the destruction of the Roman Empire, whereas previous victorious barbarians had often adopted the institutions they found existing. He died in 453 with his project unaccomplished. In 456 the Vandals sacked Rome, and in 473 Odoacer their chief was proclaimed King of Italy, with the fall of the Emperor Romulus

Augustulus, the W. Roman Empire came to an end.

The date A D 476 given to the fall of the W Roman Empire is unimportant. The W half of the Empire had lost most of its power long before then, though its influence as a civilising force, albeit greatly weakened, was to persist in the Church and, later, in the Holy Roman Empire (qv). For many years before A D 476 the W. Empire had been semi-barbarian. The power of the provinces had grown at the expense of Rome, the army had consisted for the most part of barbarian mercenaries. The unwieldy structure, over-expanded in spite of the warning of Augustus, was perishing of its own internal defects, which the very essence of the Empire, its size and centralisation, involved.

Over the causes of the decline of the Roman Empire historians still dispute. The immediate causes were the barbarian invasions and the administrative difficulties of raising forces to meet them and of paying such forces, as the old citizen army of the Roman Republic had long since perished (see ROMAN ARMY).

Numerous suggestions have been made, of which some are important and others are not backed by much evidence. One view places as the fundamental cause the lack of patriotism due, according to some, to bad administration, pressing too hardly on the middle class, always protagonists of civic interests, others attribute it to the disintegrating effect of Christianity within a pagan Empire. But under Constantine, the Empire was Christianised or the Christians paganised—which actually occurred is irrelevant, in either case the disintegrating effect must have been prevented. Another view holds that the barbarians had conquered Rome from within before the invasions became successful. Rome spread wider and wider, but failed to civilise her subject races. The result was the decay of Roman civilisation long before the military collapse of Rome. Others hold that the causes of

the decline were economic. Agriculture in Italy declined, trade decreased, the city civilisation of Rome was overshadowed by the growth of great estates run by serf or slave labour, these taking the place of the intensively worked small holdings of the republic. The underlying reasons for these changes have been put down to causes as various as soil exhaustion, over-taxation, and climatic changes. Certain it is that agriculture in S. Italy deteriorated even in the great age of the Antonine Emperors, and that of N. Italy in the succeeding age.

On such controversy the final word will perhaps never be pronounced. Most of these factors played their part in the decline of the Roman Empire: the slow decay of economic life, the infiltration of barbarian elements into positions of power, the lack of patriotism, the bad administration, civil and military, in particular the division of the Danube frontier between the two halves of the Empire. Most of the causes mentioned, except climatic changes and Christianity, were inherent in the Empire itself, which contained the seeds of its own decay. Its very size made administration difficult, its long frontiers and important chains of communication made necessary a standing army, a heavy burden on a primitive economic system. Its unity was in its Emperor and its administrative system; for the rest it was a hotch-potch of races and religions. The ordinary citizen had little political part to play, and little but the name of Rome to stimulate his patriotism.

Again, as to the nature of the transitional period known as the Dark Ages, there is considerable controversy. The older view was that the power of Rome, political and cultural, fell before barbarian onslaughts, with faint survivals in Italy and the most Romanised parts of the Empire, such as Gaul. On this there was agreement; the dispute was between those who argued that the barbarians, rude and uncivilised, swept away Rome and plunged the world into centuries of

anarchy and slaughter, and those who pointed out the barbarians as noble savages, originators of the democratic institutions which were in vogue in the Victorian Age. Modern scholarship has shifted the field of dispute. Noble savages are left to anthropologists and historians to-day discuss the nature of the Dark Ages and the extent to which Roman civilisation declined. Scholars point out how great was barbarian influence and how Roman civilisation had declined before the invasions led to its military collapse. Others working on the history of the Dark Ages see greater survivals of Roman custom than their predecessors. While the Romans had been subject to barbarian influence, the barbarians had to some extent been Romanised. These views lead to the conclusion that the decline was not sudden, that instead of an abrupt change in the 5th cent., the transition was gradual from the great age of the 2nd cent. to the Middle Ages, and that such breach in continuity as occurred came with the Mohammedan invasions later, which interrupted the commerce of the Mediterranean.

In the Dark Ages the influence of Roman civilisation was strong except in the remote provinces such as Britain. In this period trade was generally declining, particularly after the Frankish defeat of the Frisian (9th cent. A.D.), the great N. European seafaring and trading people. Cities dwindled in importance and in agriculture the transition to the feudal and manorial system of the Middle Ages proceeded rapidly. The Dark Ages cannot be considered as a period of stagnation following the civilisation of Rome. They are marked by the development of the Church, Feudalism, and the medieval economic system.

The Church's influence spread continually in this period. The baptism of the Frankish king Clovis allied the Church with the Frankish monarchy, the strongest of the age. The Church in its monasteries was the successor of the cultural side of Rome, in its ecclesiastical princes and in the Papacy.

above all it kept alive the traditions of the Roman Empire. The acquisition of land by bequests made the Church economically important. Round cathedrals and abbeys were gathered craftsmen and agriculturalists. The possession of vast tracts of land by the Church aided the growth of feudalism (*qv*).

The development of Feudalism gave the Dark Ages an organisation which was to persist until its gradual decline in the later Middle Ages. Such stability as this organisation of society could provide stayed the decline both in economic and cultural affairs which had persisted since before the fall of the W. Roman Empire.

In the Dark Ages developed the manor (*qv*) of the Middle Ages, considered as an agrarian organisation. There were two main ways in which it arose. The villages of the invading Germanic tribes were composed of free men. These free cultivators were not the powerful element in the tribal organisation, but a class comparatively poor with little or no say in the government, which was the privilege of the powerful military leaders. In the troubles of the Dark Ages these village communities, not so free and independent as used to be thought, would probably have commended themselves to the protection of some powerful overlord, would have surrendered their freedom, such as it was, and their ownership of the soil, in return for military protection. Thus the feudal system came to be imposed on a primitive form of semi-communal agriculture, and from this emerged the mediæval manor.

In those provinces of the Empire which had been closely connected with Rome, the manor has a different though similar origin in the Roman villa. In both the Roman Empire and the Germanic territories large estates cultivated by serfs had been growing at the expense of free small farmers.

Politically the main features of the Dark Ages are the growth of the barbarian kingdoms, forerunners of the

modern States, the power of the Papacy and the Holy Roman Empire, its great rival. Some of the barbarian kingdoms adopted a Romanising policy, for example, the Burgundians, who derived their legal code from Roman Law and the Visigoths. Others did not succumb to the magic spell which seemed to surround the name of Rome. Such were the Lombards, Vandals, and, greatest of all, the Franks. The Frankish kingdom, ally of the Papacy against the Lombards, was the greatest political force of the Dark Ages. Founded by Clovis, it became, under the Carolingian Kings, the bulwark of W. Christianity against the attacks of Saracens and heretics. In its heyday the Frankish Empire included most of modern France and Italy and much of what is now Germany. But the Frankish custom of dividing the kingdom amongst the sons of the king led to its final division, and it was from the E. half that the Holy Roman Empire emerged. The empire of Charles the Great (Charlemagne, *qv*), the greatest and most famous of Frankish Kings, was won by a series of military conquests against the Lombards, the Saxons, the Moors of Spain, and a host of tribes outside the empire, Slavs, Avars, Danes, etc. The Emperor was crowned in 800, and the dynasty lasted until 887, but the Empire had already been split up according to the Frankish custom. There followed a number of smaller kingdoms, some of which were again united in an empire, the Holy Roman Empire, in the 10th cent.

Early in this cent. a renewal of barbarian attacks dislocated the kingdoms of the W. From the N. the Danes and Vikings left their permanent mark in Normandy from the E. the Hungarians ravaged vast districts, penetrating into Italy and Saxony, and were only defeated in 955 by Otto I. Henry IV made Saxony a strong kingdom, and laid the foundations of the Holy Roman Empire, which was begun in 962 by the coronation of Otto. Thus and the other great mediæval institution, the

Papacy (qv) also arising to power in the Dark Ages were to contend with each other for the supremacy of medieval Europe until wrecking each other's strength they laid open the way for national states

The Dark Ages in short is the period of transition between the civilisation of Rome and the Middle Ages. In this period emerged the institutions of the Middle Ages: feudalism and the economic system and political organisations of the Papacy and the Holy Roman Empire. See also PAPACY, HOLY ROMAN EMPIRE, FEUDALISM and BYZANTINE EMPIRE.

See further Davis *Medieval Europe* chaps 1-3.

Dark Room, a specially darkened studio for photographic work. As much of the material used in photography is sensitive to light many operations must be conducted in complete darkness or at least only in such light as is non-actinic that is which has no appreciable action upon sensitised plates, films and papers. A dark room used to be a necessary adjunct to every photographer's activities but since the invention of roll film, film packs etc. it is often possible to dispense with a dark room for loading the camera while light proof developing tanks have made it possible to develop without one. But every amateur who takes his hobby seriously will still find occasion to need a dark room even if it is no more than a cupboard or a bath room from which light has been excluded.

A safe light in the case of ordinary plates and films may be ruby coloured. If the room has a window and is likely to be used in daylight that window may be covered with non-actinic fabric. It is best to exclude all light from the window and to use a dark room lamp with any illuminant that may be available. Such a lamp may be improvised with the help of suitable non-actinic fabric or glass but it is better to buy a suitable one of recognised make and the photo-

grapher who does much of his work in a dark room should take steps to make sure of its safety. He may do so by shutting himself in the room and in the light which he proposes to use there take a plate from the box cover half of it with a piece of card and leave the other half exposed for 4 or 5 minutes. He should develop the plate and should the dark room light be unsafe the uncovered part will appear darker than the covered showing traces of fog. It is often possible to adapt a bathroom for the purposes of a dark room and it is convenient to have adequate supplies of water for washing plates and prints after development. A special table for the photographer's use is desirable and shelves or a cupboard devoted entirely to chemicals and apparatus he will need.

Darling (1) Australian river which rises in the Dividing Range in Queensland and flows generally S.W. to join the Murray at Wentworth. The main tributaries are the Culgoa and Warrego. Its length cannot be properly estimated owing to drying up for long periods in the wet season when it is navigable to Bourke it is c. 1000 m. long. (2) Range of hills in W. Australia parallel with the W. coast in the district of Perth. Length c. 400 m. highest point 1500 ft.

Darling Charles John Darling 1st Baron (b. 1849) English judge. Called to the Bar in 1874 he became a Q.C. in 1882 and entered Parliament as Conservative member for Deptford (1888-97). Knighted and appointed Judge of the High Court in 1897. Privy Counsellor 1917. Retired in 1933. created baron 1934. Author of *Scintille Juris* (1877) *Seria Ludo* (1893) et.

Darling Grace Horsley (1815-1842) English heroine daughter of the light house keeper on Longstone one of the Farne Islands. In 1838 the *Forfar* skiff was wrecked near the lighthouse and with her father she rowed out to the wreck in a heavy sea, rescuing 9 people. She afterwards died of consumption.

Darlington, busy manufacturing town of S Durham, on the R Skerne. Its industries include engineering, especially the building of locomotives, coal-mining, and coarse spinning. The importance of Darlington grew with the opening of the first English passenger railway from Stockton in 1825. The town dates from the 10th cent, and before the industrial era was noted for its linen. Pop (1931) 72,093.

Darmstadt, German town, capital of Hesse, between Mannheim and Frankfurt. It is divided into an old town and a new, the latter dating from the beginning of the 19th cent, containing the Government buildings, the ducal palace, and an important picture gallery. There are several schools, and a library with many old manuscripts. Manufactures include machinery, chemicals, and metal founding. The celebrated chemist von Liebig was a native of the town. Pop (1930) 80,500.

Darnley, Henry Stuart, Lord (c 1545-1567), second husband of Mary Queen of Scots, whom he married in 1565, though he did not share her crown. He was disliked by the regent Murray, and soon estranged from his wife. He was persuaded to murder David Rizzio, and helped Mary to escape to Dunbar. In 1567 Darnley was killed in the house where he had been staying with Mary. He was the father of James I.

Darrow, Clarence Seward (b 1857), American lawyer. Called to the Bar in 1875 and practised in Chicago. Appeared as counsel in a number of important cases, amongst them the Debs strike case (1895), the Steunenburg murder (1907), and the Dayton "monkey" trial. Has written on social and economic affairs.

Dart, small Devonshire river, noted for its beautiful scenery. It rises in Dartmoor, and flows mainly S to join the English Channel at a deep inlet by Totnes. Length, c 35 m.

Darter, or *Snake-bird*, a bird closely related to the cormorant (*g v*), but differing in its much longer neck and

heron-like pointed bill. Darters are found in S America, Africa, tropical Asia, and Australia, fishing in rivers and ponds after the manner of cormorants, but nesting in trees.

Dartford, town in Kent c. 3 m S of the Thames and 10 m E S E of London. There are manufactures of chemicals, metal goods, and paper, and from the neighbouring chalk quarries lime is produced. Dartford has many interesting historic associations: here Emperor Frederic II married by proxy Isabella, daughter of King John and mother of Henry, King of Jerusalem, in 1235, and here Wat Tyler's rebellion broke out in 1381. A convent was established in 1355, later used as a residence by Henry VIII and others. Pop (1931) 28,028.

Dartmoor, a high tableland in S W. Devon, some 180 sq m in area, with an average altitude of c. 1600 ft. In several places it rises to high hills, or tors, of which High Willhays and Yes Tor are both over 2000 ft high. The scenery is picturesque and wild, but there are a number of dangerous mires and swamps where the rivers rise.

Dartmouth, port and holiday centre in S Devon, 30 m S of Exeter. Some of the Crusaders set out hence, and it was held successively by both sides in the Civil War. There are a 14th cent church and remains of a Tudor castle. Dartmouth is a yachting and boat-building centre, and the Royal Naval Cadet College is situated there. Pop (1931) 6707.

Darwin, Charles Robert (1809-1882), English naturalist, and author of the *Origin of Species*, was born at Shrewsbury. His mother was a daughter of Josiah Wedgwood, and he was a grandson of Erasmus Darwin. He studied botany and zoology in his own time, and was asked in 1832 to join the *Beagle* as naturalist on a surveying voyage to S America and the Pacific. It was on this five years' voyage that he collected the material upon which he largely based his theories, comparing the fossils of S America with the living animals there and on neighbouring

published in 1874 Other books include memoirs and children's stories



Alphonse Daudet

1867), French politician and writer, son of Alphonse Daudet He was a deputy 1919-24 In 1925 his son was found dead, and Daudet was imprisoned for pressing an accusation of murder He was rescued and fled to Belgium, but returned to Paris in 1930 His works include *Les Morticolas* (1894) and *Le monde des images* (1919) Editor of *L'Action Française*, the chief organ of the French Royalist movement

Daugavpils, Latvian city on the W. Dvina R, formerly known as Dvinsk Is the headquarters of the Latvian Army, and occupies a position of great strategic importance Was a Russian fortress until the World War Pop 43,250

Daumier, Honoré (1808-1879), French cartoonist As contributor to *La Caricature* he became notorious for the violence of his social satire and his attacks on the Government He served 6 months' imprisonment for an attack on Louis Philippe, in which the monarch appeared as Gargantua Soon after his release he began work for *Charivari*, another satirical periodical, for which he worked for the remainder of his career That he was also one of the finest painters of his time is shown by such pictures as *his Don Quixote* and *Sancho Panza* and *his Good Samaritan*

Dauphin, from c 1370 until 1830 the title of the eldest son of the King of France

Dauphiné, ancient French province,

He is best known as a master of characterisation, in that respect being similar to Dickens, but his style is much smoother

Daudet, Léon (b

now represented by the departments of Isère, Hautes Alpes, and Drôme Charles V gave the district to his heir, and thereafter the name Dauphin attached to all Royal heirs until 1830 The cap was Grenoble

Davenant, Sir William (1606-1668), English poet and dramatist His best-known poem was *Gondibert*, an epic, his first play, apart from masques and entertainments devised for the Court, was the *Siege of Rhodes* (1656) This introduced the "operatic" note into Restoration tragedy

Davenport, American town in Iowa, on the Mississippi R There is a large trade in agricultural produce, and many factories of railway accessories, flour, foodstuffs, and agricultural machinery and implements Pop (1930) 60,750

Daventry, ancient town, Northants, 15 m W of Northampton It is famous for the wireless stations erected by the B B C, and is the Dainty in Shakespeare's *King Henry VI*. Pop (1931) 3608

David (d c 1015 B C), the second of the Kings of Israel, his history is related in the Biblical books of 1 Samuel and 1 Kings He was a shepherd-boy, and a skilful harpist, and in 1 Sam xvii-xviii is described his victory, single-handed, over the Philistine giant, Goliath On the death of Saul, David was received as King of Judah, and 7 years later the whole of Israel came under his rule He conquered Jerusalem and made it his capital, and subdued the Ammonites, Moabites, and Edomites, but his later years were troubled by the revolutions raised by his sons In his 32 years' reign he proved himself a great law-giver and military commander Though he was not the composer of all the Psalms attributed to him, some are almost certainly authentic

David, Welsh princes

DAVID I (d c 1203), married Henry II's half-sister, Emma (beheaded 1192) Driven from Wales, 1194

DAVID II (c. 1206-1246), submitted to Henry III at Gloucester and Lon-

lon but was engaged in a perpetual struggle for independence

DAVID III (d 1283) nephew of David II engaged in warfare with his brother and with Edward I. He led the last national struggle of Wales in 1282 and was executed at Shrewsbury

David I (1084-1153) King of Scotland from 1124 son of Malcolm Canmore and St Margaret. In 1135 as an English baron he marched against Stephen of England to defend the claims of Matilda to the throne. He was routed in 1138 at Northallerton in the Battle of the Standard and returned to Scotland to devote himself to the internal consolidation of his country and the organisation of a feudal kingdom governed by a parliament. He founded many schools and monasteries

David II (1174-1371) King of Scotland succeeded his father Robert Bruce in 1329 having been married at the age of 4 to Joanna daughter of Edward II of England. In 1333 he fled before the English invasion of France returning in 1341. In 1346 he was captured in an abortive invasion of England being defeated at Neville's Cross and until 1357 was in prison in England. He died in Feb 1371 and was succeeded by Robert II his sister's son by Walter Stewart

David, Jacques Louis (1748-1856) French painter whose work was exceedingly popular during the classical revival in France. He drew upon ancient Roman history for most of his subjects but his well known portrait of Madame Récamier shows his art at its finest

David, St patron saint of Wales. *Annales Cambriae* mentions his death in 601. Was Bishop of Menevia afterwards called St Davids. He was canonised in the 12th cent and many legends have gathered round his name. Feast-day March 1

Davids, Thomas Wm Rhys (1843-1907) English scholar and authority on Buddhism. Professor of Comparative Religion at Manchester and

of Pali and Buddhist Literature at University College London. Among his publications are *Buddhist Suttas* (1881) *Buddhism* (1889)

Davidson, John (1872-1909) Scottish poet and novelist author of *Fleet Street Elegies* (1893) and *Ballads and Songs* (1894) and of a remarkable series of *Testa* sent of various types of man. He was found drowned at Penzance

Davidson, Randall Thomas, 1st Baron (1848-1930) Archbishop of Canterbury (1903-28) born at Edinburgh became Domestic Chaplain to Archbishop Tait whose *Life* he helped to write in 1891 and to Queen Victoria 1878. In 1891 he was made Bishop of Rochester in 1895 Bishop of Winchester and in 1903 Archbishop of Canterbury. He crowned King George V in 1911. In 1908 he presided over the Lambeth Conference attended by 25 bishops. He was keenly interested in the reunion of Christendom. He resigned in 1928 receiving a barony

Davies, Ben (b 1856) Welsh tenor one of the finest of oratorio singers. Davies became very popular in England America and Australia as a concert and festival singer

Davies, Fanny (b 1861) English pianist studied with Madame Schumann at Frankfurt and so became the most authoritative interpreter of Schumann's piano music

Davies Sir Henry Walford (b 1869) English musician born at Oswestry Salop. He was first a chorister and subsequently assistant organist at St George's Chapel Windsor. He taught at the Royal College of Music from 1890-1903. He was knighted in 1902. Of his compositions *Eliogabalus* (1904) is the most impressive but he has also written *The Four Savings of Jesus* (1911) *Son of St Francis* (1912) a symphony and church and chamber music. Of recent years his talks on musical subjects have been broadcast by the BBC to a large and appreciative public

Davies, William Henry (b 1871)

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Alphonse Daudet

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EGYPTIAN SCULPTURE THE SCRIBE
(U. B. Louvre P)

Welsh poet, spent his early life as a tramp and odd-job man. For 6 years he wandered about America, where he lost a foot while "train-jumping," and for 8 years led a similar life in England, tramping, peddling, and sleeping in common lodging-houses. For an account of his life, see his *Autobiography of a Super-Tramp*. His poems, which reveal an intimate knowledge of and love for Nature's beauties, were collected in 1928.

Da Vinci, Leonardo, see **LEONARDO DA VINCI**

Davis, Henry William Carless (1874-1928), English mediæval and political historian. During the War he directed the Department of Overseas Trade, Professor of Modern History at Manchester (1921), and Regius Professor at Oxford (1925). Curator of the Bodleian Library (1926), and Director after 1902 of the *Dictionary of National Biography*. He was an authority on mediæval history, and wrote *England under the Normans and Angevins* (1905), *The Political Thought of Treitschke* (1914), etc.

Davis, Jefferson (1808-1889), President of the Confederate States of America, born in Kentucky. In 1857 he assumed the leadership of the S. democrats, and on the election of Lincoln as President in 1860, and the secession of the slave-holding States, Davis was elected President of the Confederacy, and succeeded in organising an efficient Army and Navy, whose success, however, proved temporary.

Davis was captured in May, 1865, by Union forces and imprisoned. Two years later he was released on bail, and went to Canada. He was included in the 1868 Amnesty, and settled down on his estate in Mississippi. He wrote *The Rise and Fall of the Confederate Government* (1881).

Davis, John (1550-1605), English navigator, set out in 1585 to find a N.W. passage. Tried again in 1586-7, passing through straits named after him, connecting Baffin Bay with the Atlantic. Discovered the Falkland

Islands in 1592, and sailed with Raleigh to the Azores, 1596-7. He was killed by pirates near Singapore on his last voyage. He invented the "Davis" quadrant, and wrote *The Seaman's Secrets* (1594) and *The World's Hydographical Description* (1595).

Davis Cup, see **LAWN TENNIS**.
Davis Strait, part of the Arctic ocean between Baffin Island and Greenland. It connects in the N. with Baffin Bay. There are scattered Danish settlements on the Greenland coast. The Strait was named after John Davis, the Elizabethan seaman.

Davitt, Michael (1846-1906), Irish Nationalist, born in co. Mayo. He joined the Fenians, and was sentenced to 15 years' penal servitude in 1865 on a charge of importing arms into Ireland. On his release in 1879 he returned to Ireland, and with Parnell started the Land League, an anti-landlord organisation. He was re-arrested, but released in 1882. In 1890 he opposed Parnell; in 1898 he helped O'Brien to form the United Irish League to unite all Irish Nationalists. Though he sat in Parliament, he had little faith in its procedure. He hated England, and wished to tackle the Irish land problem as a Radical Socialist. His own speeches in 1888-9, published as *The Defence of the Land League*, contain the essence of his doctrine. He retired from Parliament as a protest against the Boer War.

Davos, well-known Swiss Alpine valley in the canton of Grisons. It is in considerable repute as a holiday and health resort, and contains the two villages of Platz and Dörfli. The inhabitants are mainly of German origin, Teutonic settlement having begun in the 13th cent. At one period iron-mining was of importance. Davos Lake is at the N. end of the valley.

Davy, Sir Humphry (1778-1829), English chemist, born at Penzance. He studied under Lavoisier and Nicholson and became superintendent of the Pneumatic Institution in Bristol. There he studied the properties of nitrous oxide, and as a result was made

assistant lecturer by the Royal Institution London becoming a professor in 1802. He dealt first with agricultural chemistry publishing later the *Elements of Agricultural Chemistry* (1813) and then with electro-chemistry. His paper *On some Chemical Agencies of Electricity* won him European recognition and he was awarded the Prix Napoléon. His work on potassium and sodium followed in 1807. His health broke down in this year but he announced important discoveries on the nature of chlorine. In 1812 he was knighted and the next year he set out with Faraday (qv) as his assistant on a two years tour of Europe. At Florence he discovered the composition of the diamond. On his return to England in 1815 he studied fire-damp and used the results of his research in the invention of the Davy safety lamp for miners. He was elected President of the Royal Society in 1820.

Davy Jones, mythical character who dwells at the bottom of the sea which is called *Davy Jones Locker*. His name possibly derives from *Duffy* a sailors name for a spirit revered by the W Indian negroes and Jonah the prophet.

Dawes Chas Gates (b 1862)



Gen. D. Wes.

American Brigadier General and financial expert. He was Comptroller of the Currency (1897-1901) and after working as construction engineer on the N Ohio Railway joined the Engineers when the U.S.A. de-

clared war on Germany in 1917 becoming Brigadier-General in 1918 partly

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Dawson George Geoffrey (b 1844) editor of *The Times* 1912-19 and since 1923. Went to S Africa in 1901 where he was private secretary to Viscount Milner and edited the *Johannesburg Star* (1903-9) returning to England in 1910. During Wickham Steed's editorship of *The Times* (1910-21) Dawson was Secretary to the Rhodes Trust (1911-21). He was recalled to the paper on its reorganisation after the death of Lord Northcliffe.

Dawson City Canadian city capital of Yukon on the Yukon R. It lies in the Klondike district and during the gold rush at the end of the 19th cent became very populous. It is still the chief centre of the gold industry though it has greatly declined. Sawmilling is also carried on. Pop (1930) 980.

Dax, town in the Landes department France on the R Adour. It is a well known inland watering place and its mineral baths have been used since Roman times. There is trade in timber and kindred products and in livestock. Parts of the Church of Notre Dame are 13th cent and the church of St Paul is 15th cent. There are ancient fortifications. Pop 12,383.

Day the period of time (24 hours) in which the earth makes one rotation on its axis. Astronomically a day is reckoned to begin at noon for civil purposes at midnight.

Day Thomas (1748-1829) English author a friend of Edgeworth and an



DUTCH ART PHILIP II OF SPAIN
(By Rubens, Windsor)

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Day Thomas (1748-1820) English author a friend of Edgeworth and an

acquaintance of Rousseau. He wrote *The History of Sandford and Merton*.

Daylight Saving. A device for the better utilisation of daylight by a temporary abandonment of sun-time in summer, suggested as far back as 1907 by William Willett. In order to procure economy in light and fuel a Summer Time Act was passed in 1916, providing that all clocks should be put forward an hour for a period of c 5½ months each summer. This emergency measure was perpetuated by an Act of 1925, and adopted by many other European countries. Its advantages are principally apparent in urban districts, as the agricultural day is adapted to the hours of daylight without legal interference.

The period of summer-time in Great Britain now begins at 2 a.m. on the day next following the third Saturday in April (or the second Saturday when the third is Easter Day), and ends on the first Saturday in October. The official hour for altering the clocks is 2 a.m. on Sunday.

At present Daylight Saving is in practice in—

Great Britain, Irish Free State, Canada (in some places), New Zealand, France, Belgium, Holland, Finland, Greece, Rumania, British Honduras, Argentine, Brazil, Chile, Soviet Union and Mexico (all the year round), U.S.A. (in some States only), Spain, and Portugal.

Day Nurseries, or Crèches, are places where children too young for school may be left while their parents are at work. In addition to being fed and looked after, the children are also under medical supervision.

In England the National Society of Day Nurseries co-ordinates with the National League for Health, Maternity, and Child Welfare, with the Ministry of Health as Final Authority.

Day of Atonement (Hebrew *Yom Kippur*), the most solemn day in the Jewish calendar, occurring always on 10th Tishri, corresponding with the end of Sept. It is a full fast day of 24 hours, observed from sunset to star-rise of

the following day, in which neither food nor drink is taken, in accordance with Biblical command (Lev. xvi. 29). It was observed in ancient times by an elaborate sacrificial ritual, in which the High Priest, representing the whole of Israel, interceded for Divine pardon. Since the destruction of the Temple, this has been replaced by a special liturgy which includes a form of corporate confession and a series of prayers designed to parallel the ancient Temple services.

The Day of Atonement is also associated with the belief that on this day God concludes the annual judgment of all creation and their destiny for the succeeding year.

Dayton: (1) City in Ohio, U.S.A., on the Great Miami R. A number of skilled trades are carried on, including the manufacture of aeroplanes, office equipment, refrigeration plant, factory fittings, and sports implements. During the World War the American department of aeronautical research was established here. There are handsome public buildings, several parks, and a number of aerodromes. The field used by the Wright Brothers in their early experiments is near by. Pop. (1930) 201,000. (2) Town in Tennessee, U.S.A., famed for the trial of a schoolmaster for teaching evolutionary doctrine against a State law, since when the town has been popularly known as *Monkeyville*. Famous counsel took part, and the prosecution, which was successful, was supported by William Jennings Bryan. The finding was overridden on technical grounds by the Supreme Court, no opinion was passed on the constitutional aspect of the matter. Pop. 1800.

Daytona Beach, town of Florida, U.S.A., a well-known winter holiday resort, most famous for the magnificent sands, where many attempts on the world's land-speed record have been made. Sir Malcolm Campbell and Sir Henry Segrave set up record here. Pop. (1930) 16,600.

Deacon, office in the Christian

hurch Originally the order which as one of the three orders of bishops, priests and deacons was permanent and the deacon had many vaguely defined duties. To-day in the Anglican and Roman Catholic churches a deacon is an individual ordained to assist in the ministry below that of a priest. In the Presbyterian church he is a layman ordained and appointed to attend to the secular affairs of the church. In some nonconformist churches he is an assistant to the regular minister.

Deaconess, a woman with duties similar to those of a deacon. The office existed in the Early Church and was revived in the 19th century.

Dead Book of the, ancient Egyptian collection of religious texts for guiding the departing soul safely through the dangers of the Amenti, the lower world. This work or a selection from it, was placed with the mummy in his tomb. Copies have been recovered and translated into English.

Deadly Nightshade, a stout herbaceous plant 3-4 ft high with large egg-shaped leaves and solitary drooping bell-shaped flowers lurid purple in colour. The berries are black and as large as cherries, flattened and with a persistent calyx. This poisonous plant the most dangerous in Britain because of its active toxic properties and the attractive appearance of its berries is fortunately rare growing principally in old quarries and among ruins. See also **BELLADONNA**.

Dead nettle, a plant of the family *Labiatae*. The leaves are heart-shaped tapering to a point serrated and stalked. The stems are square which distinguishes the plant from the true nettle which it closely resembles. The white dead nettle is an erect plant and has large pure white flowers and black stamens. The red dead nettle is a common weed of spreading habit with purple-tinged leaves and small purple flowers. The yellow dead nettle or archangel resembles the white variety but is taller and has close whorls of large

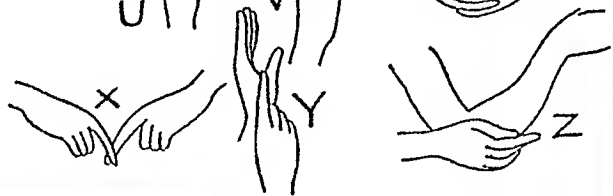
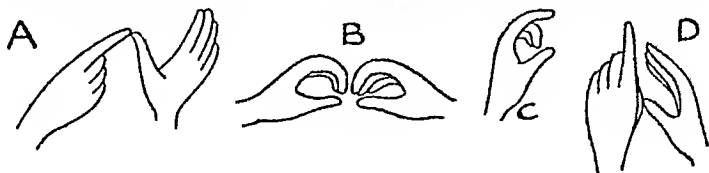
handsome yellow flowers. It is found in damp woods and hedges and flowers from May to July.

Dead Sea, a large lake in S. Palestine 48 m long fed by the Jordan. It is the lowest lake in the world 1'000 ft below the Mediterranean Sea and it is the most salty. The surroundings are extremely beautiful and the mild climate is suitable for a winter health resort. Ancient tales of the Dead Sea as a lake without plants, birds or fishes are entirely fictitious and are probably due to the lack of fish life owing to the extreme salinity of the water. There is no outflow and evaporation is considerable so that the lake is 8 per cent salt and sodium chloride and asphalt float on the surface. The Dead Sea has been known from very early times and is often mentioned in the Bible. Its S. end is believed to cover the sites of Sodom and Gomorrah (q.v.).

Deaf and Dumb Instruction of. Throughout the Middle Ages those unable to hear or speak were regarded as insane and were excluded from society. In the 16th cent. successful attempts were made by monks to teach the deaf by writing and in 1600 Juan Paulo Bonet a Spaniard wrote a book on the subject. In England his lead was followed by Bulwer Holden and Dalgarno and in 1760 schools for the deaf and dumb were opened in Edinburgh and Farnham. The London Asylum for the Deaf and Dumb being established by Thomas Bradwood in 1792. What facilities there were were supported by charity until 1893 when as the result of a Royal Commission enquiry compulsory State education for deaf children between 7 and 16 was introduced.

To-day there are in England and Wales over 30 schools catering for c. 5000 children of which 14 are in London. Of these the day schools are maintained by the Local Education Authorities and the residential schools by voluntary committees. Teaching is usually carried on by lip-reading less frequently by writing. Vocational and

MANUAL ALPHABET



craft training is also given. The incidence of deafness among children is now just under 1 per thousand. Experiments are being made in separating children according to their mental capacity and whether they were deaf born or not.

These schools are controlled by the medical branch of the Board of Education. The chief organisations dealing with the problem are the British Deaf and Dumb Association and the National Institute for the Deaf (founded in 1911 reorganised in 1950). The latter provides higher education and issues propaganda for reform. An International Conference of Teachers of the Deaf was held in London in 1953 with delegates from 16 countries in attendance.

The first country to introduce compulsory State education for the deaf was Denmark in 1817.

Deakin, Alfred (1856-1919) Australian politician entered the Victorian Legislative Assembly in 1878 and the Federal Cabinet in 1901. He was at the Imperial Conference in London in 1887, became Prime Minister of Australia in 1903 and was again in office 1905-8 and 1909-10. At first republican in tendency he later became a keen Liberal Imperialist insisting that Australia should be preserved for the white races. He retired in 1910 through ill health. He wrote several books on irrigation.

Dean (1) Head of a Cathedral Chapter in the Church of England. He is responsible for the upkeep of the fabric for the services and generally for the management of business connected with the cathedral. The *Dean of Arches* is the chief judge of the Ecclesiastical Court of Arches (*q.v.*) A *Rural Dean* is a priest appointed by a bishop to act under an archdeacon as the officer responsible for the business of a group of parishes in the diocese. (2) In most universities head of a faculty. (3) At Oxford fellow of a college with disciplinary duties over the undergraduates. (4)

At Christ Church Oxford the head of the college.

Dean, Forest of, Gloucestershire district immediately E. of the Wye. It has been a royal preserve for centuries and though in these days much of the timber is gone tracts of country are still typical forest areas of great natural beauty. Both iron and coal are mined in the district and there are remains of Roman iron mines. Area c. 700 sq. m.

Death The question whether a body once dead can return to life is a most interesting one and gives rise from time to time to the most heated arguments. Probably however differences of opinion arise simply because the definition of the term death has not been clearly agreed upon at the outset. Death has not the same meaning to a medical scientist as to a medico-legal expert. The legal view of death which is the view shared by most people is that it is a cessation of those processes in the body which are usually taken as signs of life. These are three in number: the beating of the heart, breathing in the lungs and evidence that the brain is conscious. Failure of any of the processes is followed by death from syncope, asphyxia or coma respectively. Consequently when the presence of death is suspected one should (a) feel the pulse, (b) look for breathing with the aid of a mirror placed in front of the nose and mouth and (c) try to rouse the patient from his apparent sleep. The question then arises: Can we if all these attempts give negative results assume that life is extinct? If we use the definition of death commonly or legally accepted the answer to this question is 'Yes' but if we consider the question from a scientific aspect it is 'No'.

There are many authenticated instances in which after bodies have been pronounced dead and in some cases even the legal procedure authorising burial has been effected, breathing, pulse and consciousness have returned to the astonishment of

friends Well-informed medical men have left instructions in their wills to ensure that their bodies are given a favourable opportunity of returning to normal life before being finally interred They have, in common with many lay people, left additional instructions that before actual burial a surgeon is to be summoned to sever the arteries in the neck, thus leaving no chance of an awakening in the grave

Death in the scientific sense refers to the cells of the body rather than to the body as a whole It is on record that after a man's head has been severed from his body by the guillotine the heart has gone on beating for an hour before stopping In this case, while the man is clearly dead, his tissues are clearly still living Scientifically, then, death is defined as a permanent cessation of all the vital processes in the cells of the body, and the substitution, sooner or later, of processes of putrefaction

Now there are conditions of the body which very closely resemble a state of death, such as apoplectic stroke, narcotic poisoning, epileptic and hysterical trance, apparent drowning and apparent death from electric shock, and in the last case hope should not be abandoned until artificial respiration has been carried on for as much as 3 hours Taken together with the fact that in this country a doctor may sign a death certificate without viewing the body, which amounts to leaving the decision as to whether death has or has not taken place to relatives or friends, who are often unqualified to make such a decision, it becomes clear that further details of criteria by which the state of death in the scientific sense can be made certain should be more widely known

With coma, absence of breathing, and absence of pulse we have already dealt, but other changes are also produced by death of the cells, *i.e.* cooling and stiffening of the body A progressive and steady fall in the

temperature of the body to that of the surrounding air is certain evidence that the vital biochemical processes in the body have come to an end In fact, we can often estimate roughly how long a body has been dead from the temperature at which we find it The stiffening, known as *rigor mortis*, always precedes the onset of putrefaction Whereas before its onset the muscles will contract on stimulation, perhaps by pinching, and always by electric current, yet after *rigor* is established, they will no longer respond

Once obvious decomposition has set in, the body becomes soft again, and undergoes characteristic discoloration, but at this stage we are left in no doubt as to whether life can ever return Such a thing has certainly never been recorded In connection with this putrefaction there are several points which arouse public interest from time to time, namely, the state of preservation of bodies or portions of dead bodies found under suspicious circumstances So long as putrefaction has not taken place, a body will not lose its form or structure, and since putrefaction is dependent upon several factors, any of which may be absent, its onset may be indefinitely delayed Apart from the putrefying micro-organisms which cause it, it is essential that water and air be present, and that the temperature be higher than the freezing-point of water Occasionally, animal bodies which must be thousands of years old are found in the ice in colder regions of the earth, and their flesh is used as food This is an example of cold storage as a means of arresting putrefaction

Mummification is produced by the arrest of putrefaction by dehydration, *i.e.* by removal of water This can be rapidly carried out by soaking a body in methylated spirit, which dissolves the water, and then driving off the spirit by placing the body in a hot-air oven. This form of preservation must not be confused with

another kind known as adipocere (qv) formation which is brought about by the combination of the tissues of the body with ammonia. The first stage of putrefaction consists in the conversion of the tissues of the body into fatty substances and it is really the conversion of these fats to soaps which gives rise to this type of preservation. Examples are seen in bodies found disposed of by immersion in cesspools which are rich in ammonia and its salts. The condition is also seen in bodies taken from the alkaline waters of long rivers in warm climates and sometimes in bodies unearthed from sites of very deep burial. In this last case however the exclusion of air during the early stages has played some part in delaying putrefaction and allowing the ammonia produced by what putrefaction does occur to act in the way described.

A better example however of the effect of excluding air is seen when bodies are buried in quicklime. In this case the surface of the body is converted to a burnt jacket which successfully excludes air from the deeper tissues which are in consequence often preserved intact.

A doctor is bound by law under penalty of very heavy fines to issue a certificate of death if he has been in attendance upon the deceased during the last illness even though this may have been weeks before the actual death.

Death, Registration of. On the death of a person the Registrar of Births Marriages and Deaths must be given the required information and the register signed in his presence within 5 days or written notice sent within 14 days. The persons whose duty it is to give the notification are the nearest relative of the deceased in attendance during the last illness or any other relative being in the same sub-district as the deceased or any person present at the death and the occupier of the house where the death took place or any inmate of the house. If death occurred outside a house

any relative or any person present at the death or taking charge of the body must inform the Registrar. Burial cannot take place except upon the Registrar's or the Coroner's certificate.

Death Duties, duties payable on the passing of property on the death of a person. They are (1) *Estate Duty* leviable upon the value of all property real or personal settled or not settled which passed whether by will or under an intestacy including gifts or dispositions made by the deceased within 3 years of death. It may be remitted in respect of property passing to a lineal descendant or widow to an amount not exceeding £100 where the value of the estate does not exceed £5000. (2) *Legacy Duty* leviable on all legacies and shares of residue and varying according to the relationship between deceased and legatee. (3) *Succession Duty* payable on real or personal property by the person who succeeds to it. Neither legacy nor succession duties are payable where the property exclusive of property settled otherwise than by will does not exceed £1000 in value and estate duty has been paid upon it.

Death's Head Moth, so called from the likeness of a large yellow patch on the thorax to a human skull is a large handsome moth related to the hawk moths. It is remarkable for the sound it produces. The larva by snapping its mandibles together emits a clicking sound comparable to a series of electric sparks whereas the adult insect squeaks possibly by expelling air through its proboscis. The imago in the chrysalis utters a similar squeak but not so loud. This moth has been known to enter hives and rob bees of their honey.

Death Valley sterile valley c 50 m. by 30 m. nearly 300 ft. below sea level, in California, E. of the Sierra Nevada. The valley and its containing walls are practically devoid of vegetation being encrusted with alkaline salts, and the walls are striped with vividly coloured strata.

Death-watch, the name given to a small, wood-boring beetle, which is very destructive to furniture, and especially to rafters and beams of the floors and roofs of buildings. They lay their eggs in the wood, in which the larvæ dig deep burrows. The well-known ticking noise is a sexual call, and is made by the beetle tapping its head against the wall of the burrow.

Similar sounds have been attributed to so-called book-lice (*q v*), but the ability of these to produce the ticking has been doubted.

Deauville, well-known French seaside resort on the N W coast, a few m S of Le Havre. The races and regatta are fashionable events. Pop c 5000.

Debenture, a security by way of a charge on its assets frequently given by a company in consideration of a loan. The debenture may charge some specific property, or it may be a pleading charge on all the property, both present and future, of the company. See STOCKS AND SHARES.

Debreczen, large town in Hungary due E of Budapest, and c 30 m from the Rumanian border. It is an important railway centre, and has considerable trade in agricultural produce. There are a number of small local industries, including soapmaking, food-stuffs, and leather. Debreczen is a strong Protestant centre, and is noted for its general cultural activities; it has a university. The town was a rallying centre for refugees during the Turkish advance in the 15th cent. Pop (1930) 117,300.

Debs, Eugene Victor (1855-1926), American Socialist and ex-stoker. He was President of the American Railway Union (1893-7) and organised a big strike. He became a Socialist in 1897, and was a candidate for the Presidency of the U.S.A. in 1900, 1904, 1908, 1912 and 1920, on the last occasion he was in prison. In 1918 he was imprisoned for his pacifist activities, but was released in 1921. He edited various journals, and wrote several books on Socialism, amongst them *Unionism and Socialism, a Plea*

for Both (1904) and *Industrial Unionism* (1905).

Debt, a sum of money due from one person to another. The now obsolete common law action of debt lay when a sum certain was claimed under a contract alleged to have been made or on some matter of fact from which the law would imply a contract. Debts are assignable at law if the assignment is absolute and in writing, and written notice is given to the debtor.

Debt, National, the total amount of loans raised by a State either from its own citizens or abroad. In the Middle Ages loans for the prosecution of war and the ceremonies of peace were raised by the King. At the Restoration the London goldsmiths advanced money to the State on the security of some part of the revenue, and in 1694 the whole business was transferred to Parliament on the foundation of the Bank of England, a loan of £1 million being raised, repayable at any time after 1705. By that year, however, the National Debt had already topped £50 millions, while the Seven Years' War, the American War, and the Napoleonic Wars raised it to the colossal figure of £840 millions. Since the time of Queen Anne most large loans have been raised at a fixed rate of interest, sometimes at par and sometimes above or below, according to the state of the market in relation to the interest offered. Floating or short-term debts are another aspect of public indebtedness.

Until 1870 the origin of the National Debt was exclusively the financing of war, and this still remains the predominant factor. In the 20th cent. loans were raised for such new purposes as public works and housing. Sinking funds have been instituted at various times to reduce the National Debt, notably by Pitt in 1786 and Baldwin in 1923. The action of such funds is so slow that it takes long periods of peace and low expenditure to make any appreciable reduction. In 1923 a sinking fund contribution c

£5 millions a year was proposed but circumstances prevented its establishment. The National Debt is controlled by the National Debt Commissioners. The rise and fall of the British National Debt has been as follows (in million pounds)

1894	1	1905	7633
1797	52	1906	7631
1831	146	1927	1440
1754	243	1935	519
18153	601	1908	600
19034	743	1920	306
1914	878	1931	7553
19305	829	1932	7445

1 End of Seven Years War

2 End of American War

3 End of Napoleonic Wars

4 End of Boer War

5 End of World War

Meanwhile the cost of the debt service has risen from £4 millions in 1773 to £34.6 millions in 1915, £46 millions in 1914 to £353 millions in 1930 and now provides the chief item of the national budget.

See also WAR DEBTS. DEBT CONVERSION. NATIONAL INCOME AND EXPENDITURE.

Debt Conversion the paying off of an old loan by the proceeds of a new one usually bearing a lower rate of interest. By judicious conversion at times of cheap money a considerable saving in the amount of annual service may be made. Conversion is only possible in cases of securities of unimpeachable safety and is usually confined to Government stocks. Occasionally as in war time conversion may be to a higher rate of interest when it has been necessary to assure lenders of participation in any more advantageous offer that may follow. These high interest bearing war loans are the first to be converted in time of peace. Conversion is usually voluntary the alternative being repayment but is occasionally compulsory as in the Italian Victor Loan (1906). The first large national debt conversion was that of Pelham (1749) who achieved the replacement of £54,500,000 4 per cent stock with stock bearing 4 per cent for 1 year 3½ per cent. for 7 years and 3 per cent thereafter.

In 1822 Vansittart converted £150 millions 5 per cent stock to 4 per cent at 105 and this was in turn converted with the option of exchanging old stock at 0 for 5 per cent at par in the new or reissue at par bearing 3 per cent in 1830. Childers attempted conversion of £613 millions 3 per cent in 1884 was a complete failure but 4 years later Goschen converted £358 millions 3 per cent to 2½ per cent stock to be reduced to 2¼ per cent in 25 years.

The period 1901-2 was occupied with the conversion of the high interest short period War Loans. These conversions however were chiefly with the object of delaying maturity and effected little reduction in interest. The latter aim was attempted by a series of operations beginning in 1904 and culminating in the conversion by Neville Chamberlain of £985 millions 5 per cent War Loan to 3½ per cent in July 1930. The offer proved a complete success 9 per cent being converted with a saving in interest of over £30 millions a year.

The conversion of internal debt makes no difference to the total wealth of the country. It has two direct effects: it reduces taxation thereby stimulating industry and employment and it reduces the purchasing power of the *rentier* or non-earning classes. It is undisputed that the former benefit outweighs the latter disadvantage and successful debt conversion is commonly regarded as a portent of improved trade and increasing prosperity. See also NATIONAL INCOME AND EXPENDITURE.

De Bunsen, Sir Maurice (b. 1835) English diplomat was British Ambassador in Vienna in 1914. He sat on the Commission of Inquiry on Modern Languages in 1917 and was sent in 1918 on a mission to S. America. He retired in 1919.

Debussy Claude Achille (1862-1918) French composer born at St. Germain-en-Laye. His development on original lines was aided by his admini-

tion and study of the Russian "nationalist" composers, which was later to be manifested in the opera *Pelleas and Melisande*, whose form was influenced by Debussy's interest in *Boris Godunov*. In *Pelleas*, melody as such was abandoned, and a melodic line approximating closely to that of the human voice in recitation was made a beautifully expressive medium for conveying subtle suggestions of changing emotions. A more striking originality was apparent in his pianoforte works: the harmonic system that he employed enabling him to achieve wonderful atmospheric effects that revealed new possibilities. Works like the now well-known *L'Isle Joyeuse*, *Jardins sous la Pluie*, and *La Cathédrale Engloutie* were an important development in the history of piano music, besides being extremely beautiful. Some of his chamber music works betray a similar if less effective interest in unusual instrumentation, which is also evident in *L'Après-midi d'un Faune*.

Decadents, see **SYMBOLISTS**

Decalin, commercial name for decahydro-naphthalene, which is naphthalene which has been completely reduced by catalytic hydrogenation. Decalin is a colourless liquid of pleasant odour, and boils at 190°C . It has the formula $\text{C}_{10}\text{H}_{18}$. It is employed as a solvent and cleaning-agent.

Decalogue, the Ten Commandments believed to have been given to the Jews by Moses (Ex. xv 1-17 and Deut. v 6-21). There are two forms given in the Old Testament, they are probably an expansion of an older code of moral laws. The first 4 laws lay down certain duties to God, and the remainder express a code of social morality. These laws have been taken over by the Christian religion, and are embodied in the Catechisms of many churches.

Deccan, Hindu term for the whole of the great S. tableland of India formed by the E. and W. Ghats and by the Vindhya Mountains in the N. See **INDIA**.

Deceased Wife's Sister Act, - see **CONSANGUINITY**

Decemvirs, a name given by the Romans to any official group of 10 men, more particularly to the 10 patricians who (451-449 B.C.) were engaged in codifying the laws of Rome, hitherto traditional and handed down from generation to generation. There was also a judicial body of decemvirs who formed a civil court.

Decimal Coinage, coinage such as that of the United States and most European countries, in which the principal unit—e.g. the dollar, the franc, the mark, is divided into parts on the decimal system, e.g. 100 cents = 1 dollar. Such a system has the advantage of simplicity. The institution of a decimal coinage in England, usually by the division of the shilling into 10 parts, has often been advocated.

Decius, Gaius Messius (c. 200-251), Roman Emperor, born in Pannonia. Sent on an expedition by the Emperor Philip, he was himself elected Emperor by the soldiers, and defeated Philip at Verona in 249. He was engaged in constant warfare with the Goths, and brutally persecuted the Christians.

Declaration, (law). A statutory declaration is a voluntary statement made before a justice of the peace or other person authorised to administer oaths. It is a misdemeanour to make a declaration wilfully false in a material particular. A dying declaration is a statement made by a person conscious of his impending death and who has given up all hope of recovery. It is admissible as evidence in a court of law on the principle that such a person has every inducement to speak the truth.

Declaration of Independence (1776), made by the 13 English Colonies in N. America breaking away from all allegiance to the British Crown. The Declaration, which was mainly the work of Thomas Jefferson, actually only carried one stage farther the American progress to independence. Already in Dec. 1776 the Congress

had declared itself independent of the English parliament. By this declaration it repudiated allegiance to the Crown. The Declaration was largely based on the teaching of Rousseau and the French 18th-cent. philosophers on the Rights of Man.

Declaration of Indulgence (1687) the proclamation of James II repealing all religious tests and penal laws against Roman Catholics and Dissenters. The Declaration was republished in 1688 and ordered to be read in the churches. Their refusal to do this led to the trial of the Seven Bishops (Primate Sancroft, Bishops Ken, Lake, Lloyd, Turner, Trelawney and White) who were acquitted.

Declaration of Paris (1856) a declaration adopted with the Treaty of Paris to establish four principles of international law. They were: (1) privateering to be abolished; (2) the neutral flag might cover enemy goods except contraband of war; (3) neutral goods except contraband of war not to be subject to capture under an enemy's flag; (4) blockades (q.v.) to be binding must be effective & maintained by a sufficient force. This was adopted by Great Britain, Russia, France, Prussia, Austria and Turkey, and the U.S.A. and Spain observed its principles during the Spanish American War. The Declaration was superseded by a Convention of The Hague Conference 1907, the main provisions of which are that no merchant ship transformed into a war vessel can have the rights and obligations attached to this condition unless it is placed under the direct authority, control and responsibility of the power whose flag it carries; that it bears the distinctive external signs of war vessels of its nationality; that its officer commanding is properly commissioned by the competent authorities; and that his name appears in the list of officers of the combatant fleet; that the crew is subject to military discipline. The transformation of a merchant ship into a war vessel must be mentioned

as soon as possible in the list of vessels belonging to the combatant fleet and the vessel must observe the laws of war.

Declaration of Rights *see* BILL OF RIGHTS

Declination *see* COMPASS

Decomposition *see* DEATH

Decorated Style Style of English Gothic architecture between Early English and Perpendicular (*see* ARCHITECTURE). The corresponding French style is Flamboyant. The Decorated period is subdivided into *Geometric* (1145-1315) and *Curvilinear* (1315-60). The names are based on the treatment of the windows. In Geometric Decorated large windows having any number of lights up to nine (e.g. L window, Carlisle Cathedral) were adorned with tracery forming parts of curves or even complete circles, often cusped. Curvilinear Decorated is characterised by the ogee or reversed curves producing reticulated or flowing tracery. Examples are W window, York Minster; octagon, Ely Cathedral; rose window, Lincoln. Carved ornament is elaborate and vaulting is developed by the tierceron or additional rib. The liern or decorative cross rib appears at the end of the period. Towers and spires are lofty and pierced with openings of Decorated Tracery with crockets and finials on the outer arch moulding, e.g. tower at Lincoln spires at Lichfield.

Decoration, Amateur With correct procedure and sufficient care in its application decoration can be successfully accomplished by most amateurs, whether it be painting, papering or distemping.

Ceilings Old distemper should first be washed off with a fibre brush, cold water and a sponge. Cracks must then be filled in. Keene's cement is probably the easiest for the amateur to use, though a mixture of plaster of Paris and finely powdered whiting to which water is added is also effective. Bad cracks must first be cut out to a width and depth of c. $\frac{1}{2}$ in. with a

small triangular tool sold for the purpose. This removes any loose plaster, and gives a large enough area for the filling to grip. The holes must be well moistened, the new plaster pressed in, and the edges smoothed off carefully with a trowel or old knife. Final rubbing with glass paper should ensure that the repairs are flush with the surrounding surface. If ordinary distemper or whitewash is to be used the ceiling should be given a coat of clear ole to ensure uniform porosity. It is not, however, necessary if water-paint (washable distemper) is to be used, but the special primer made for the purpose should be used when c 12 hours have elapsed. The distemper or water-paint should be applied by means of a distemper brush, only the tip of which should be dipped in the distemper. Work should then begin from a corner near the window and proceed in strips across the room. The distemper should be brushed out in all directions, finishing towards the light. Care must be taken to keep the edges wet so that all strips dry out the same colour, and for this reason the doors and windows should be closed while work is in progress, and opened when finished to accelerate drying. A well-papered ceiling makes an excellent foundation for distemper, and only requires to be wiped over with a clean dry cloth before the new surface is applied. If previously distempered over paper, the old distempers must be washed off to avoid loosening the paper.

Walls. The two best treatments for the amateur are water-paint and wall-paper. If the wall is covered with not more than one thickness of paper in good condition and the colours are fast, the water-paint may be applied over it, after wiping down with a dry cloth. When treated with water-paint the wall should just be washed down, rinsed and wiped. Any cracks must be made good in the manner already described. If ordinary size distemper has been used, it should be completely removed by washing with ammonia and water. The distemper should be

applied with a good bristle brush, beginning at the top of the wall and using an upward and downward movement over strips c 18 in wide. Only as much distemper as can be accommodated on the brush to permit it to "flow" freely and not drip should be used. Any splashes on floor or woodwork should be wiped off immediately. The water-paint should be mixed according to the maker's directions, and must be frequently stirred during use. If a room is to be papered, old paper must first be removed by wetting thoroughly with a brush all over. The part first treated should then have soaked sufficiently to permit the paper being scraped off with a stripper. Repeated soakings are sometimes necessary in parts. When all paper is removed, cracks and holes must be filled in and then the whole given a coat of size.

The edges of the new paper must be trimmed, cutting a narrow strip of selvage from one side of the whole from the other. When trimming patterned papers the right and left sides should be marked so that mistakes will not occur when overlapping. Pasting can be done on any long deal table with the paper face downwards and an edge just overlapping one side. Mark the lengths to indicate top and bottom and begin pasting at the bottom, brushing outwards from the centre. After treating c 3 ft fold lightly with pasted sides facing and continue till the roll is finished and in one lightly folded pile. Lift the length by the top corners between thumb and finger, and press again: the top of the wall, making certain hangs straight. Fix at the top with paper brush and then brush straight down the length and sides. Trim the bottom end by creasing in to start in and then cutting. With following strips (work should proceed from either side of the window) lap joints of c $\frac{1}{2}$ in are easiest and should overlap toward the light. Work should be as speed as possible and a plumb-line use when necessary.

Woodwork if in fairly good condition will only require rubbing down with pumice stone and water or with glass paper to give a key for the new paint the surface afterwards being washed and dried. Cracks should be filled in with a prepared filler and the edges smoothed off. When hard they must be rubbed with glass paper. If the surfaces are very bad the old paint should be removed with a blow lamp or non alkaline prepared paint remover.

One or preferably two thin under coatings are then applied the same brand as the finishing coat should be used. Good brushes are essential and must include a sash tool for narrow mouldings. When dry the first but not the second coat is lightly rubbed with the finest glass paper. If oil paint is used for the first coat it should be laid on horizontally and then brushed out in all directions finishing with light strokes the way of the grain. Enamel flows more readily and may be laid on in any direction with the final strokes upwards. All paint is best applied sparingly and well brushed out and care should be taken to remove any tears as they form. All brushes after use should be cleaned in turpentine and stored without damage to the bristles.

Decoration Interior *see* INTERIOR DECORATION

Decorations dignities awarded for military or civil service and bravery. They include the various orders of chivalry (Garter c 1340 Bath 1399 Thistle 1687 St. Patrick 1788 St Michael and St George 1818 Star of India 1861 Indian Empire 187 Royal Victorian Order 1896 Order of Merit 1907 British Empire 1917) but the word is usually applied to the medals gained in war time. The chief military medals are Victoria Cross (1856) Distinguished Service Order (1886) Distinguished Service Cross (1914) Military Cross (1914) Distinguished Flying Cross (1918) Air Force Cross (1918) Indian Order of Merit (1837) Distinguished Conduct in the Field (1914) Dis-

tinguished Conduct Medal Distinguished Flying Medal (1918) Air Force Medal Medal of the Order of the British Empire Meritorious Service Medal Volunteer Officers Decoration Territorial Decoration Royal Naval Reserve Medal and New Zealand Cross (1869)

Decorations for civil work include the Royal Red Cross for red cross work Imperial Service Order (1902) civil service Kaiser Hind Medal (1900) India Edward Medal (1907) mining rescue King's Police Medal (1909) police and fire brigade Imperial Service Medal (190) Imperial civil service Voluntary Medical Service Medal (193) VAD and Badge of the Order of the League of Mercy

A total of 3714 decorations were awarded in the S African War and c a quarter-of a million in the World War

Decoy [*pron* DEKOH] strictly either a tame or artificial duck so placed as to lure wild ducks within gunshot range. Its wider application is to any means by which a person is lured into a trap.

Decretals Papal decrees which have authority in Canon Law (*qv*) on ecclesiastical matters. Decretals have from time to time been collected e.g. the Decretals of Gratian. Most famous is the collection known as the *False Decretals* apparently made with the object of strengthening Church government in general and in particular and increasing the power of the Papacy. One of the decrees being the Donation of Constantine i.e. the supposed grant to the papacy by Constantine of temporal power over the lands of the W. Roman Empire.

Dedication (1) In Christian usage the setting apart of an object for religious usage. Churches for example are dedicated for divine worship. This dedication accompanied by appropriate rites is common to most advanced religions. (2) Jewish feast commemorating the cleansing of the Temple after its destruction by

etc., are absolutely privileged and not actionable. Other statements enjoy a qualified privilege, and are not actionable unless malice is proved, these include statements made in the performance of a duty, as by an employer in answer to enquiries as to a former servant by a person wishing to engage that servant, or statements made by the defendant in the protection of a lawful interest, e.g. his own reputation, fair comment on matters of public interest, e.g. dramatic criticism, reports of parliamentary and judicial proceedings.

Defeasance, in law, a condition relating to a deed which, on fulfilment, renders the deed void.

Defence, in law, denial by the defendant of the truth of the complaint or accusation (see PLEADINGS). Defence of one's self, spouse, parent, child, master, servant, or property is always a justification for bodily injury inflicted on an aggressor, provided it was reasonable in the circumstances.

Defence of the Realm Acts, a series of Acts passed during and after the World War conferring on the King in Council the power to take extraordinary measures for the defence of the realm. They are popularly known as DORA. Certain of their provisions, especially in relation to the permitted hours for opening shops and for the sale of intoxicants, were made permanent by post-war legislation, which has not met with universal approval.

Defender of the Faith, title given to Henry VIII of England by Pope Leo X (1521) as a reward for Henry's treatise against Luther. Deprived of it by Paul III on his breach with the Papacy, he was re-awarded the title by Parliament (1544), and it has been adopted by all English monarchs since.

Deflation, see INFLATION.

Defoe, Daniel (c. 1660–1731), the author of *Robinson Crusoe*, was almost the first professional journalist in England. He was a dissenter by birth and upbringing, and he first made his mark with a pamphlet, the *Shortest Way with the Dissenters* (1703),

which was a scathing satire upon the intolerance of the Church party. For this he had to stand in the pillory. In 1704 he started the *Review*, a periodical which appeared three times weekly. *Robinson Crusoe* (1719) is an amazing "writing up" of an actual occurrence and, by virtue of its vividness and reality, has many affinities with the novel as later developed. Indeed, whatever Defoe wrote, he made it appear convincing, and this applies to his *History of the Plague* (of which he can hardly have had any personal recollection), *Memoirs of a Cavalier*, *Captain Singleton*, and *Moll Flanders* are but a few of the better-known of his other works. There is hardly a type of prose fiction of which the beginnings cannot to some extent be traced in his work.

De Forest, Lee (b. 1873), American inventor of wireless apparatus. He was the first to use alternating-current transmission, and improved the thermionic valve detector and amplifier. Modern wireless and sound-films were made possible by his inventions. He holds over 200 radio patents.

Dégas [pron. dā'gah], **Hilaire Germain Edgar** (1834–1917), a French impressionist artist, whose paintings, drawings, and lithographs illustrate the life of Paris and of his time. Café interiors, dancers on the stage and at exercise, nudes of women bathing, jockeys, and racehorses—all find their place in his art and all are revealed with a fine and sensitive understanding, beautiful draughtsmanship, and a wonderful handling of colour and light.

Degoutte, Jean Marie Joseph (b. 1866), French general, entered the Army from



Daniel Defoe

St Cyr in 1890 and served with distinction in Madagascar China and Morocco In the World War he was chiefly responsible for success in the second battle of the Marne and later commanded the French army of occupation on the Rhine (1919-'21)

Degras, or cod oil the dirty emulsion of fatty oils with water which is obtained as a residue from the felling of hides It is separated and used in further leather treating processes and also in the manufacture of cheap soaps The term is also used of the fat obtained during the washing of sheep's wool

Degree a diploma conferred by a university as an acknowledgment of the attainment of a certain standard of education The more usual English degrees are BA MA BSc MD DSc Mus D B Litt DPh Mus R D D DD BCom and LL D (for explanations *see* **ABBREVIATIONS**) In America the various stages of the craft are spoken of as degrees of which there are 3

Degree *see* **GEOGRAPHICAL TERMS**

Degrees of Freedom (here) the number of variable factors that can exist in any one system Thus in a system consisting of water and water vapour there are two factors concerned the temperature and the pressure and if one of them is varied the other must also follow suit if the system is said to contain both water and water vapour it is therefore stated to have one degree of freedom If however we have a system consisting of ice water and water vapour there is only one condition of temperature and pressure at which this system can exist and a variation of either factor (temperature or pressure) will cause one of the components to vanish The system is therefore stated to have no degrees of freedom *see* **PHASE RULE**

Degumming and Laccating—

De Heretico Comburendo, a statute of 1531 against the Lollards By it a heretic convicted of one offence of blasphemy and refusing to recant was to be burned

Dehra Dun and Dehra, district and town of the United Provinces India N.E. of Delhi near the lower slopes of the Himalayas Much of the land is fertile and the climate is temperate tea is the chief product It became British in 1814 The town of Dehra is notable for its temple the centre of a sect of Ascetics The India Forest College headquarters of the Trikonometrical Survey is here Area 1'00 sq m pop district 21'00 town 33'000

Deira, ancient British kingdom the S portion of Northumbria the capital was York It was united with Bernicia to form Northumbria about the 7th cent

Deirdra or Derdrin, in Celtic legend a beautiful maiden who was destined in childhood to become the wife of King Conchobar of Ulster and was brought up in a secluded place in the charge of an old nurse When the three sons of Unech (Ulin) and loved one of them Nais who with his brothers carried her off to Scotland where they lived for some time But Conchobar at last decoyed them to his Court and after they had been slain Deirdre committed suicide

Deism, a belief which emerged in England during the 17th cent holding that the world was created by a God separate from it, who after its creation did not meddle with it *see* **DEISM** In opposition to this, is the sufficiency of reason and rejected revelation It attacked Christianity as revealed in the Scriptures The school represented an important stage in the development of free thought It perceived a useful service both to Christianity and its opponent by exposing the uncritical view of the Bible that then obtained It maintained a vigorous rationalism that to the dogmatism of the latter served mainly to stimulate enquiry The most important Deists were William Wollaston (1659-1724) and Anthony Collins (1626-1712)

Dekker Thomas (1771-1841) English dramatist The dates and details of his life are obscure but

some of his plays, tracts, etc., survive. His works, which contain intimate and humorous studies of London life, and some beautiful lyrics, include the prose satire, *The Gull's Hornbook* (1609), and among his plays are *The Shoemaker's Holiday* (1600), and *The Honest Whore* (1604, 1630—2 parts).

Delacroix [*pron* DELAKRWAN], Ferdinand Victor Eugène (1799–1863), French painter, made his mark as one of the first leaders of the romantic movement in revolt against cold and lifeless formalism. His *La Barque de Dante* was the first of his paintings to be exhibited in the Salon in 1822. His most characteristic paintings are rich with the light and colour of the South and East. He was among the forerunners of the Impressionist school, and Monet studied his works closely. He produced a number of mural paintings for the Chambre des Députés, the Luxembourg, and the Hôtel de Ville, and, despite early unpopularity, he attained wide recognition before his death.

De lafield, Elizabeth M., nom-de-plume of E. M. Dashwood, English novelist, a daughter of Count Henry de la Pasture. Her works include *The Pelicans*, *Messalina of the Suburbs* (1924), and *Women are like that* (1929), but she is best known for the *Diary of a Provincial Lady* (1931). Her comedy, *To See Ourselves* (1930) was also successful.

Delagoa Bay (*Bahia de Lourenço Marques*), large inlet at the S end of Mozambique, S Africa. The town of Lourenço Marques (*qv*) stands on its shores. Delagoa Bay was discovered by de Campo at the beginning of the 16th cent. It has been an important trading district for several centuries owing to the proximity of rivers and the good harbour.

De la Mare, Walter (b. 1872), English poet. His delicate and imaginative work has won an appreciative public, and his books for children are particularly popular. His best-known volumes are probably *The Listeners* and *Other Poems* (1912) and *Peacock*

Pie (1913). He is also author of *Henry Brocken*, a novel (1904), *The Three Mulla-Mulgars* (1910), *Memoirs of a Midget* (1921), *Stuff and Nonsense* (1927), *Poems for Children* (1930), and *Lord Fish* (1933).

Delane, John Thaddeus (1817–1879), English journalist, and editor of *The Times* from 1841–77. It was during Delane's term of office that *The Times* achieved its position as a national newspaper. Blowitz and Chenery were among his foreign correspondents.

De la Ramée, Louise (1839–1908), English novelist. Wrote under the name *Ouida*. She achieved enormous success with *Strathmore* (1865), *Under Two Flags* (1867), and *Moths* (1880). Her pictures of fashionable life are exaggerated to the point of unconvincing burlesque, but her 60 or more books enjoyed tremendous popularity, and are even still read.

Delaroche, Paul (1797–1856), French painter, whose historical works had great success. His chief work was the huge picture painted for the École des Beaux Arts, containing portraits of the artists of Europe and figures of the muses.

Delaware, small State of the U.S.A. on the Atlantic, the NE portion of the peninsula between Chesapeake Bay and Delaware Bay, and one of the thirteen original States. The entire State is of fairly low elevation, and there are considerable marshes and swamps in the S, the coast is sandy, with small creeks. In the South it is level and little cultivated, while the N is a fertile agricultural district, producing, among other crops, fruit in large quantities, vegetables of all kinds, and cereals, large herds of cattle and sheep are raised, and dairy farming and leather are valuable industries. Manufactures have rather lagged behind, but the World War stimulated iron and steel, meat-packing, paper-making, and other industries, fisheries are important. There are no minerals of note, though stone and clay are of some value. Trans-

port is good and is asisted by the several small but navigable rivers

The population shows a fair proportion of negroes though they are increasing much less rapidly than the whites The State Constitution is democratic and provides franchise for all who can read The chief towns are Dover the capital Wilmington (100 000) and Newcastle

Delaware was first settled by Europeans in the early 17th cent it belonged first to the Dutch Its name is said to be a corruption of that of the De la Warr family Area 2 350 sq m pop 240 000

De la Warr Herbrand Edward Sackville 9th Earl (b 1900) British politician He was appointed Under Secretary to the War Office under the Labour Government 19 9-30 Secretary to Ministry of Agriculture and Deputy Minister of Fisheries 1930-1 and again in the National Government in 1931

Delcassé, Theophile (185 -1923) French statesman Deputy 1889 and Colonial Minister 1894-5 As Foreign Minister he effected in 1904 the Franco British Treaty regarding Morocco and Egypt which so aroused German resentment that he was forced to resign He brought about the fall of the Clemenceau Government 1909 in a debate on the Navy In 1913 he was sent as Ambassador to Russia to strengthen the Franco Russian alliance against Germany He became Foreign Minister under Viviani 1914 and in 1915 negotiated the Pact of London securing Italy's alliance But the failure of his Balkan policy led to his resignation in 1916

Del Credere Agent, an agent for the sale of goods who guarantees for an additional commission that the purchaser is solvent and will perform his contract

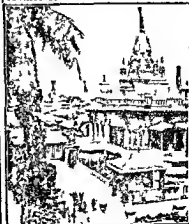
Delft, Dutch town in the province of S Holland between Rotterdam and The Hague it has given its name to the beautiful pottery produced in the town in the 17th cent Modern manufactures include New Delft pottery tobacco and chemicals The



A Trick Jug Delft Ware

Prinsenhof (now the William of Orange Museum) was formerly the residence of William the Silent In the New Church (formerly St Ursula's) is the tomb of Hugo Grotius and in the Old Church that of Admiral Van Tromp Pop (1932) 51 300

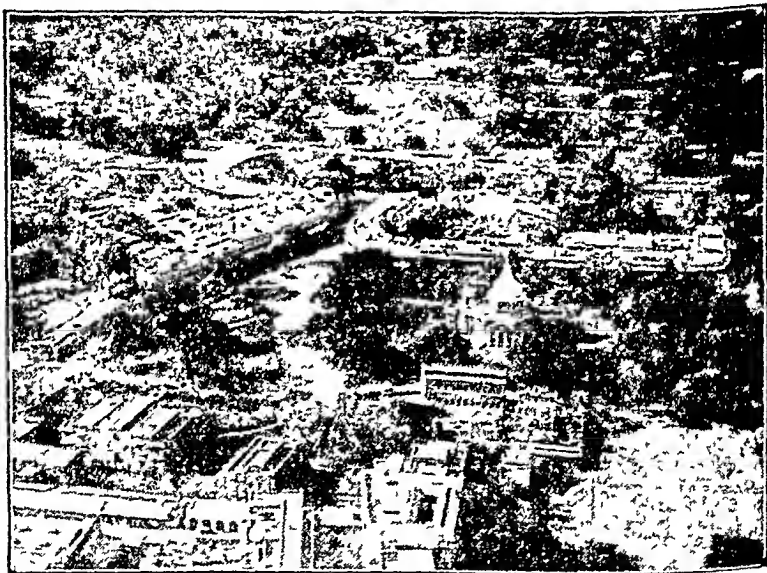
Delhi, capital of British India and former capital of the Mogul Empire situated on the R Jumna in the small province of the same name For the



Delhi Hindu Temple.

sake of clarity the old and the new cities will be considered separately. Old Delhi's principal interest lies in its architecture and its many historic associations. It is enclosed within a wall of c. 5 m circumference, and has fortifications, once part of the Emperor Shah Jehan's palace, extending a considerable distance along the river. Of the buildings, the old Imperial Palace includes the two magnificent halls of audience, in one of which, the Diwan-

under Hindu rule, was captured later by the Mohammedans, and afterwards declined. Nadir Shah of Persia took it in the 18th cent., and it is believed that he carried off the peacock throne among other great treasure. It was a rebel stronghold in the Mutiny, but was besieged and captured by the British in Sept 1857, after which it steadily developed into an important railway and cotton manufacturing centre, with additional trades in wheat,



Aerial View of Delhi

-Am or hall of private audience, the celebrated peacock throne used to stand. The Great Mosque, Black Mosque, and Pearl Mosque, and the Tomb of Humayun are all famous. The five-storied Kutb Minar Tower is 238 ft high. The historic Chandni Chauk or Silver Street was once believed to be the richest in the world.

The present city dates back only to the 16th cent, though the definite history of other Delhis can be traced back to the 10th cent. It was then

gold, silverware, jewellery, and shawls. About $\frac{1}{2}$ in from the city walls is the Ridge (60 ft), the British base at the siege of Delhi.

New Delhi was begun when in 1911 the King announced at the Imperial Durbar that Delhi was to become the new capital of British India, in place of Calcutta, and laid the foundation-stone of the new city which is a short distance S of the old. The design was in the hands of Sir Edwin Lutyens, and by now most of the building is com-

pleted. It includes a magnificent viceregal residence, University Government buildings, the Nizam of Hyderabad's palace and the Record Office. The streets are well laid out and the whole is planned so far as possible to unite with Old Delhi and form one great Anglo-Indian city. The Viceroy's House was officially opened in 1931.

The area of the administrative pro-



Delhi: New Parliament Building

vince of Delhi is 824 sq. m. the pop. of the cities and cantonment is 440,000.

Delian League or Confederacy a federation of Greek States under Athenian leadership formed in 478 B.C. and lasting until the defeat of Athens by Sparta. Revived in 378 B.C. as an alliance directed against the power of Sparta. It lasted nominally until the Macedonian conquest (see GREEK HISTORY).

After the failure of the great Persian invasion of 480 B.C. the leadership of the Greeks passed from Sparta to Athens. In order to guard against any further danger from Persia the Ionian cities of the Aegean formed themselves into a league under the natural leadership of Athens. At first each member contributed men and ships, but soon a money payment was substituted, thereby converting the members from free and independent allies into tributaries of Athens (see CROTON). The revolt (440 B.C.) and subsequent conquest of Samos by the forces of the league showed its new character as an integral link in the Athenian empire. After the Peloponnesian War (431-404 B.C.) the league died with the collapse of Athens.

The Second League may be said to have had its origin in the victory of Canon (q.v.) at Cnidus in 394 which

was the prelude to the Athenian recovery of sea power. After the Peace of Antalcidas (386) this second confederacy was formed with Sparta instead of Persia as the enemy. The defeat of Sparta at Leuctra in 371 merely substituted Thebes. The history of the second league is much less important than that of the first and it expired at the battle of Chæronea in 334.

Delibes, Clément Philibert Léo (1838-1891) French composer known today for his ballet music such as that of *Sylla in L'île Égypte* and *Coppélia*. His operatic music from *Le Poète* and *Lakmé* is still sometimes to be heard.

Deliquescent A substance is deliquescent when it has an affinity for water strong enough to absorb it from the atmosphere in large quantities. Deliquescent solids become partly or even wholly in solution on exposure to air and finally form an aqueous solution. Solutions of salts in water with a vapour pressure less than the partial vapour pressure of the water will absorb water in the air till the dilution has increased sufficiently to equalise the vapour pressures. It is more usual to apply the term hygroscopic to such liquids, e.g. sulphuric acid, as absorb water from the air, and also to solids which absorb water without liquefaction, such as activated charcoal. Typically deliquescent salts are calcium chloride and ammonium nitrate.

Delirium, s. c. COMA

Delitzsch, Franz (1813-1890) German theologian of the Lutheran Church of Hebrew descent. He worked mainly on Biblical criticism and was one of the early exponents of the Higher Criticism.

Delius, Frederick (b. 1867) one of the few really great English composers since Purcell. He published his first work in 1869 and began slowly to produce a succession of compositions, the full beauties of which were not generally realised until recent years, when Delius's importance already well appreciated by musicians became

evident to the musical public. Of his six operas, only one, *A Village Romeo and Juliet*, has been heard in this country. But such works as *On Hearing the First Cuckoo in Spring*, *A Summer Night on the River*, *Song before Sunrise*, and *Brigg Fair*, all lovely examples of his exquisitely delicate, sensitive, and original orchestral writing, are becoming popular, and his *Mass of Life* has been frequently performed in recent years. Delius, was created Companion of Honour in 1920.

Dell, Ethel May (Mrs G T Savage), English novelist, published her first novel, *The Way of an Eagle*, in 1912. This had a great popular success, and she has since written a large number of "best-sellers". Her stories are romantic and dramatic. They include *The Knave of Diamonds* (1913), *The Keeper of the Door* (1915), *Greatheart* (1918), *Letherstones* (1923), *The Black Knight* (1926), *The Altar of Honour* (1929), and *The Prison Wall* (1932). She has also published collections of short stories and verse.

Della Cruscan Academy, a coterie of English writers resident in Florence in 1785, led by Robert Merry and Mrs Piozzi. Their verse was published in English journals, and was very popular, until killed by the merciless satire of Gifford's *Maviad* and *Baviad* (1791-5).

Della Robbia, Luca, see **ROBBIA**; **CRAFTSMEN**

Delos, small Greek island of the Cyclades, now but little inhabited. Excavations have revealed many valuable and interesting archaeological remains, which include much of the Greek settlement, comprising various temples, the theatre, the commercial quarter, and many houses and sculptures. It was traditionally believed by Greeks that the island was the birthplace of Apollo, and sacred embassies journeyed there regularly from the principal States. Under the Romans from 166 B.C. Delos became an important commercial centre, but was later sacked by the Greeks for remaining faithful to Rome, and did not

regain either its religious or commercial importance. See also **DELIAN LYGAE**.

Delphi, the home of the most famous Oracle of Apollo, at the foot of Mount Parnassus, in ancient Greece, a few miles N of the Gulf of Corinth. The modern village of Kastri marks the site. Complete excavations have revealed most buildings referred to in early writings, including the Great Temple, several smaller temples, the theatre, stadium, and several treasures, also much of the Sacred Way and a number of statues, and other works of art. The Oracle answered written questions through a Pythian priestess. Legend says that when the Persian invaders attempted to raid the sacred precinct in 480 B.C. the god destroyed them by rolling down great rocks from the mountain. The same thing happened to the Gauls in 279 B.C. Delphi suffered, however, from sacrilege in the Sacred War of 356-346, and Sulla pillaged it in 86 B.C. Constantine removed the sacred tripod commemorating the victory of Plataea. When the apostate Julian wished to restore the dignity of the Oracle he was rebuffed by the Oracle itself.

Delphinium, genus of the family Ranunculaceae, named from *delphin*, a dolphin, to which animal the upper sepal bears a fancied resemblance, being helmet-shaped with a long spur at the base which conceals two petals modified to nectaries. The common larkspur is not a native, but is often found as a weed in cornfields, having blue, pink, or white flowers in racemes, and easily distinguished from other plants by the spurred calyx. The garden varieties are showy border plants, hardy annuals, or herbaceous perennials. The annuals, such as *D. ajacis*, the blue rocket larkspur, the blue *D. consolida* and the tall scarlet *D. cardinale* from California, are sown in April, $\frac{1}{2}$ in deep in an open bed or border in ordinary rich soil. The perennials are propagated by seed sown indoors in March, outdoors in April, by cuttings made in Sept or March, and rooted in sandy

soil in a cold frame or by division of roots in Oct. or March. The perennial species require rich deep soil and sunny position and liberal feeding with liquid manures in summer and a mulch with decayed manure in early spring. Popular perennial species of delfinium are *D. cashmirianum* blue *cheilanthum* dark blue *formosum* azure blue *nud caule* red *ochroleucum* soft yellow.

Delta, *see* GEOGRAPHICAL TERMS

Delta Metal, a variety of brass containing 50 per cent copper 41 per cent zinc and 4 per cent various other metals. *See also* BRASS ALLOYS

Deluge. A tradition exists both in the Hebrew religion and Babylonian mythology of a great flood sent to punish the world for wickedness. In the Hebrew story Noah and in the Babylonian Parnapsitum escape by building a boat and repopulating the earth after the waters have subsided. The two stories are closely parallel differing only in minor details. The Hebrew story is unessential to the Old Testament being rarely mentioned except in Genesis and may be a legend incorporated from Babylonian sources. Recent researches have practically proved that the story was founded on an actual flood. Greek mythology has a somewhat similar story in which the main figure is Deucalion (*q.v.*) Other deluge stories are found in various parts of the world.

Delville Wood *see* SOME BATTLES OF

Dementia *see* INSANITY

Demerara, county of British Guiana bounded on the E. by the Demerara R. (length c. 160 m.). The main products are sugar, timber, rum, and molasses. Pop. c. 17,000. *See also* GUIANA

Demesne land in a manor held by the lord of the manor or let out at will but not on feudal tenure. Demesne land occasionally surrounded the manor house but was often scattered amongst the strips in the open fields. *See also* MANOR FEUDALISM

Demeter [DEMETTER] Greek goddess of agriculture corresponding to the

Roman Ceres (*q.v.*) After the abduction by Hades (Pluto) of her daughter Persephone (Proserpine) she wandered about the earth seeking her daughter until she came to Eleusis. Here she was hospitably received by the ruler Celeus. In gratitude for her treatment she taught Celeus's son Triptolemus the secrets of agriculture unknown up to then. A temple was built in her honour at Eleusis where the Eleusinian Mysteries were celebrated.

Demise technical term in law denoting the grant of an estate in fee for life or for a term of years. By transference the term is also applied to death.

Demurge term used in gnosticism (*q.v.*) for the creator of the visible universe. The Demurge is himself created being formed out of psychical substance by Hachamoth. The name is derived from the Greek *dimourgos* creator.

Democracy government in which all classes have a voice either directly or through their chosen representatives. In the ancient world of city states it was physically possible for all the population to gather in one place and decide the affairs of the State. To-day the size of modern communities and the complexity of modern life make it necessary for democratic peoples to delegate their direct power to representatives whom they elect.

Of the two great contrary philosophic ideas in history—that of the inherent inequality of men and that of their fundamental equality—democracy expresses the latter and is thus opposed to such governmental forms as absolute monarchy, feudalism, dictatorship and rule by an aristocracy. Plato and Aristotle who held aristocracy to be the ideal regarded democracy as the lowest form of government.

The essentials of the old democracy were a free intelligent and educated community and ease of communication with the ruling centre. The great agricultural and slave-owning civilisations had therefore no democratic

element. It remained to the small, free, homogeneous communities of Greeks to institute the idea. But even among them the right to participate in government belonged only to those who were privileged citizens. Rome inherited democratic ideas from Greece, and modified them as city grew to empire. Again, the power was in the hands of the patricians, gradually and grudgingly to be shared with the clamouring plebs.

In spite of the nominally democratic teaching of the Church, the Middle Ages in fact brought the triumph of kingdoms, principalities, feudal States, and other forms of absolute government. Not until the great liberating force of the Renaissance, the dissemination of knowledge by printing, and the breakdown of serfdom, was it possible even for the seeds of democracy to be sown. Only in certain congenial soils, such as the mountain valleys of Switzerland, could freedom and equality be found.

The 17th cent. heralded, not only a philosophic emphasis on the rights of the community by Grotius and Milton, but also a democratic political resurgence, typified by the rising of the Dutch against the Spanish, and of the English against the monarchy. In the eighteenth century this flame of liberation, fanned by Rousseau and Voltaire and by the triumph of the American Rebellion, burst into the French Revolution. The absolute power of the monarchy and the nobility was overthrown, and the will of the people substituted. Excesses brought reaction and the absolutism of Napoleon, though the triumph of revolutionary France and the idea of self-expression and freedom for all sent a wave of romantic democratic idealism sweeping over the rest of Europe.

Parliaments were still rare and suffrage narrow. Republican outbreaks occurred all over Europe in 1830, and the Spanish colonies in S. America broke away to form independent republics. Further upheavals in 1848 strengthened republicanism, intro-

duced universal suffrage in France, procured democratic constitutions in many other countries, and gave birth to Marx's famous *Communist Manifesto*. In England a constitutional monarchy averted violence, but the revolution of 1830 produced a tremendous agitation for the extension of the franchise—partially granted by the Reform Act of 1832.

In America, the equal chances and hardships of men in frontier life and in a new country had ensured a strong current of democratic feeling since the earliest colonising days. After the War of Independence (which, however, was not waged entirely for democratic principles), the Constitution of the new American Republic included universal manhood suffrage, universal right to "life, liberty, and the pursuit of happiness," and laid the basis for a fundamentally democratic régime. The example of American democracy in practice proved one of the greatest stimuli to the 19th-cent. liberating movements in Europe.

These movements took two forms: first, the gradual and comparatively peaceful gaining of democratic rights under a constitutional monarchy; second, the attempted overthrow of absolute monarchies and their replacement by democratic republics.

The rest of the 19th cent. was devoted to a gradual consolidation and extension of the gains which democracy had precariously made in 1830 and 1848. Suffrage and parliamentarism rapidly extended in all countries, and at the end of the century the only important absolute monarchies that remained were in Berlin, Vienna, and St. Petersburg, where the powers of elected bodies were little more than nominal. Despite this, Britain, France, and America were almost the only countries where a democracy held the ultimate and final power.

The World War, with its discrediting of old governmental forms and its psychological emphasis on "democracy" on the part of the Allies, led to the establishment of republics in Ger-

many Austria Poland Russia Czecho-slovakia Greece and the new Baltic States. A tremendous wave of reforming enthusiasm introduced women's suffrage in most cases and gave a new power and freedom to the lower and working classes.

After a few years came a swing over to dictatorships which summarily suppressed or controlled democratic machinery. Italy Hungary Poland Turkey and Russia rapidly came under such régimes to be followed later by Yugoslavia and in the last days of the monarchy by Spain. In 1931 a democratic republic was instituted in the latter country. The most recent victory of dictatorship over democracy was gained by Hitler in Germany in 1933.

In 1933 there were 14 republics and 11 monarchies in Europe. Such a division however is misleading from a democratic point of view since several monarchies (such as England) are extremely democratic while several republics (such as Poland) are not so in any degree.

Democratic Party. One of the two chief political parties of the U.S.A. the other being the Republican Party (qv). The distinction between the two is difficult to clarify but roughly speaking the Democrats may be said to stand for Liberalism the rights of the individual States of the Union and equal rights of all classes while the Republicans tend more towards Conservatism centralised government high protective tariffs and the support of banking and industrial interests. The division of the parties dates from the dispute between Hamilton and Jefferson in the first years of the Republic. After several changes of name the followers of Hamilton evolved into the Republicans representing the merchant and moneyed interests of the old 13 States while the adherents of Jefferson became known as the Democrats and were drawn primarily from the frontier regions and the gradually expanding W. In the Civil War the N. was Republican the S. Demo-

cratic and the defeat and impoverishment of the latter combined with the rapid rise of the E. States in commercial importance proved a blow from which the Democrats took a long while to recover. The party has in fact been only four times in power since 1860 under Buchanan in 1880-9 Cleveland in 1893-7 Wilson in 1913-21 and Roosevelt in 1933.

Democritus (460-360 B.C.) Greek physical philosopher native of Abdera Thrace. As did Zeno of Elea he asserted the eternal sameness of being but denied its oneness and believed in the being of non-being &c. space. His atomic theory states that all atoms are exactly the same and their combinations different thus giving the appearance of difference in matter. He anticipated modern views of the indestructibility of matter and the conservation of energy. Democritus declared that the soul took the form of one psychic atom between every two corporeal atoms thus it was matter but of a rarer finer even divine quality. Life was maintained by inhaling fresh atoms to replace lost ones and when respiration ceased life ceased the soul perishing with the body.

He evolved a theory of colour in which he regarded black red white and green as primary. He rejected the idea of a controlling deity but forced to explain thunder lightning and earthquakes he admitted the existence of semi-divine spirits that inhabit the upper air though even these he declared were composed of atoms.

Demovire Abraham (1667-1754) Anglo-Irish mathematician who fled to England after the revocation of the Edict of Nantes in 1685. He became friendly with Sir Isaac Newton and published important works including an hypothesis on the duration of human life with special reference to the value of annuities. This stated that of 86 persons born one dies each year till all are dead.

Demonology see WITCHCRAFT DIVINATION

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After a few years came a swing over to dictatorships which summarily suppressed or controlled democratic machinery. Italy Hungary Poland Turkey and Russia rapidly came under such régimes to be followed later by Yugoslavia and in the last days of the monarchy by Spain. In 1931 a democratic republic was instituted in the latter country. The most recent victory of dictatorship over democracy was gained by Hitler in Germany in 1933.

In 1933 there were 14 republics and 11 monarchies in Europe. Such a division however is misleading from a democratic point of view since several monarchies (such as England) are extremely democratic while several republics (such as Poland) are not so in any degree.

Democratic Party. One of the two chief political parties of the U.S.A. the other being the Republican Party (q.v.). The distinction between the two is difficult to clarify but roughly speaking the Democrats may be said to stand for Liberalism: the rights of the individual citizens of the Union, and equal rights of all classes while the Republicans tend more towards Conservatism: centralized government, high protective tariffs and the support of banking and industrial interest. The division of the parties came from the dispute between Hamilton and Jefferson in the first years of the Republic. After several changes of name the followers of Hamilton evolved into the Republican and representing the merchant and moneyed interests of the old U. States with the addition of J. Q. Adams became known as the Democrats and were drawn primarily forth from the eastern and the gradually expanding West. In the Civil War the N. was led by A. A. Lincoln the S. by

Jefferson Davis and the defeat and impoverishment of the latter combined with the rapid rise of the U. States in commercial importance proved a blow from which the Democrats took a long while to recover. The party has in fact been only four times in power since 1865 under Buchanan in 1845-9 Cleveland in 1893-7 Wilson in 1913-21 and Roosevelt in 1933.

Democritus (460-360 B.C.) Greek physical philosopher native of Abdera Thrace. As did Zeno of Elea he asserted the eternal sameness of being but denied its oneness and believed in the being of non-being or space. His atomic theory states that all atoms are exactly the same and their combinations different thus giving the appearance of difference in matter. He anticipated modern views of the indestructibility of matter and the conservation of energy. Democritus declared that the soul took the form of one psychic atom between every two corporeal atoms thus it was matter but of a rarer finer even divine quality. Life was maintained by inhaling fresh atoms to replace lost ones and when respiration ceased life ceased the soul perishing with the body.

He evolved a theory of colour in which he regarded black red white and green as primary. He rejected the idea of a controlling deity but tried to explain thunder lightning and earthquakes he admitted the existence of semi-divine spirits that inhabit the upper atmosphere even these he declared were composed of atoms.

Democritus Abraham (176-184). An Irish-born coachman in London who fell into the hands of the revolutionaries of the First of March in 1793. He became friendly with Sir Isaac Newton and published important works, including an hypothesis on the duration of human life with approximate figures of the value of annuities. He stated that of 80 persons born one dies each year till all are dead.

Demonology see WITCHCRAFT
DIVINATION

De Morgan, Wm. Frend (1839-1917), English artist and novelist. He perfected a process for making lustre-ware, and ran a factory until 1901. He joined the Chelsea group of Burne-Jones and Rossetti, but in 1905, at the age of 65, turned to the novel. *Joseph Vance* is a well-written, rather massive novel. It was followed by *Alice for Short* (1907), *When Ghost Meets Ghost* (1914), and other less-known books.

Demosthenes (384 ?-322 B.C.), great Athenian orator and statesman. He took active part in Athenian politics from 354 to 340 B.C. His speeches express opposition to Philip of Macedonia, they include the three *Philippics* (351, 344, and 341) and three *Olynthiacs* (349), and one *On the Affairs of the Chersonese*. But with Philip's overwhelming victory of Chæronea, Demosthenes retired from political life. His last famous speech, *On the Crown* (330), was in answer to Aeschines's attack on Ctesiphon (the latter had proposed that the State should present Demosthenes with a golden crown). In 323, Demosthenes was involved in a struggle against Antipater, and on its failure poisoned himself rather than face capture.

Dempsey, William Harrison ("Jack")



Jack Dempsey

when he lost the title to Gene Tunney, by whom he was again defeated in the following year.

Demurrage (1) Delay in unloading from railway trucks or ships, for which payment is chargeable to the shipper.

(2) Pre-war charge of Bank of England of 1½d per ounce of gold, when bullion was exchanged for notes. This was usually paid rather than taking bullion direct to the Mint, where gold was minted into coin without charge, because of the loss of interest consequent on the delay involved in minting.

Demurrer, in law, a pleading by a defendant admitting the facts stated by his opponent, but denying that they constitute a good cause of action. It was abolished in 1883, but any point of law may now be raised and disposed of before trial by order of the court or judge.

Denaturants, substances added to intoxicating liquids such as alcohol so that, while they are rendered unfit for use as a beverage, their employment in industrial operations is not prevented. There are an enormous number of denaturants in use, each industry having a preference for one which interferes least with the properties of alcohol as they concern it. The commonest substances used are wood spirit (consisting chiefly of methyl alcohol), pyridine, aniline, and petroleum naphtha. The use of denaturants is in all countries very strictly controlled by legislation. See also ALCOHOL.

Denbigh, county town of Denbighshire (qv), c. 10 m S of Rhyl. Trade is mainly in agricultural produce. The castle dates from Edward I, the Grammar School and town hall from the 16th cent. Pop. (1931) 7249.

Denbighshire, a county of N Wales, bounded N by the Irish Sea, W. by Carnarvon, S. by Merioneth and Montgomery, SE by Shropshire, E by Cheshire, and NE by Flintshire. The surface, considered from N to S, consists of a plateau rising from a low coastal plain mounting steadily S to the Berwyn Mountains (Moel Syech, 2700 ft), the whole lying roughly between the valleys of the Conway, on the W, and the Clwyd on the E. The plateau and mountains are freely intersected with river valleys, of which the Dee, Alwen, Geirw, and Elwy are

the most notable There are great tracts of moorland where sheep and cattle are pastured and much of the land in the valleys is suitable for oats barley and a little wheat vegetables especially root crops are freely cultivated

The country is roughly divided into a N W agricultural and a S E manufacturing region Mineral deposits include coal lead sandstone and slate There are manufactures of iron and woollen goods The largest towns are Denbigh the county town Ruthin and Wrexham Colwyn Bay and Rhos-on-Sea are holiday resorts In various parts of the county are Bronze Age relics and in several mountain caves traces of mammoths and other large mammals have been found Area 668 sq m pop (1931) 157 645

Dendera Egyptian village on the Nile the site of the historic city of Tentyra sacred to the worship of Hathor the goddess of love Excavations have revealed most of the great temple which was begun c the 1st cent BC

Dengue Fever an infectious fever due to a virus transmitted by mosquitos and prevalent in warm countries It generally occurs in epidemics but is rarely fatal It begins with an attack of fever accompanied by muscular pains and headache The crisis occurs in a few days and is after an abatement for 2 or 3 days a sudden return of fever occurs accompanied by an eruption of spots Heart failure is the chief danger stimulants and nourishing food should be given and complete rest taken

Denikin Anton (b 1872) Russian general served in the Russo-Japanese War 1904 and became Lieutenant General in the World War During the Revolution 1917 he was imprisoned with Kornilov both escaping to join General Alexeyev's White Army which was opposing the Bolsheviks in S Russia Following the deaths of Kornilov and Alexeyev Denikin assumed command of the White forces repelled the Bolsheviks from S Russia

and set up a military Government But his army alienated the peasants sympathy and was routed by Budyenny's cavalry Nov 1919-Feb 1920 Denikin escaped via Constantinople to France Author of *The Russian Tyrant* and *The White Army*

Denis St (fl c 250-275) patron saint of Paris of which he was bishop in the 3rd cent Apparently he came to France as a missionary and was martyred on the hill of Montmartre (*Mons Marlyrum*) in Paris Many legends of him exist but little is known His feast is Oct 9

Denmark, a kingdom of N Europe consisting of Jutland the N portion of the great N German peninsula with a group of islands to the E of which Zealand (Sjælland) and Fünen (Fyn) are the largest others include Lolland Langeland Falster Aerø and Møn Since the Treaty of Versailles the N portion of Schleswig has become Danish by plebiscite More outlying possessions are the island of Bornholm in the Baltic and the Farø group in the far N Denmark is separated from Norway by the Skagerak (a part of the North Sea) and from Sweden by the Kattegat The extreme N of Jutland is severed from the mainland by the Limfjorden The coast line on the W is fairly regular largely composed of a sandy waste with several considerable lakes just inland including the Rungskjovng Stadil and Nissum The L is very much broken The island coasts are irregular and freely indented The Little Belt separates Jutland from Fünen the Great Belt lies between Fünen and Zealand which in turn is separated from the SW coast of Sweden by the Sound

Relief The country and islands are mainly flat and low lying Rivers are short and unimportant many of them sluggish and rather swampy but there is a good canal system The largest river is the Sudena others are the Stor Skjerve Vaarde and Rye The land is sandy and unfertile in the W but fertile and highly cultivated in the

E, and in the islands The total area is 16,500 sq m

Climate On the whole fairly mild, and with good rainfall, it is greatly influenced by the insular conditions. In the winter the E coast is fringed with ice, but only rarely are the belts and sound icebound. In general it is favourable to agriculture. The most notable native tree is the beech, which flourishes better than almost anywhere else in Europe, there are considerable pine plantations, but in the main the flora and fauna are those of N and Central Europe.

Agriculture Denmark is pre-eminently an agricultural country, exporting large quantities of foodstuffs, cereals, and live stock. The land is largely divided into small-holdings and freehold farms, and the best scientific methods of cultivation are used. Great numbers of horses, pigs, cattle, and hens are raised, and the trade in eggs, dairy produce, and bacon is notable. The principal grain crops are barley, oats, rye, and wheat, of which the first two are much the greatest. Potatoes and sugar-beet are widely cultivated.

There are no manufactures of the first importance, but brewing, distilling, and the making of margarine and sugar are carried on. Fishing is a large source of revenue, the fishing fleets comprise more than 15,000 vessels, and to this industry is due the considerable growth of the one W coast port, Esbjerg. There are no large mineral deposits, but limestone, granite, and chalk are quarried, and small quantities of coal and iron. The imports, determined by the dearth of natural products, include coal, machinery, textiles, metal goods, and timber. The leading towns are either fishing ports, agricultural, or trading centres, Copenhagen (Kjøbenhavn) is by far the largest (775,000), and others are Odense, Horsens, Aarhus, Viborg, and Randers. Pop of country, 3,542,000.

Race, Religion, Education, etc. Practically the whole of the population is Scandinavian, and more than 90 per

cent. are native born; the State religion, to which the King must subscribe, is the Lutheran. There are some 20,000 Roman Catholics; complete religious toleration is practised. Education throughout the country is of a good standard, elementary education is compulsory up to 14, and there are many public, technical, agricultural, medical, and commercial schools and colleges. The two universities are at Copenhagen and Aarhus. Railway and road communications are efficient.

Government is vested in a King (Christian X, succeeded 1912), and the Diet, consisting of two houses, the Folketing, with 149 members elected by general suffrage of all persons above 25, and the Landsting, the upper house, partly elected by voters above 35 years, and partly by the outgoing Landsting. The King exerts executive authority through the Diet, and is a limited monarch on a system largely similar to the British. Denmark is divided into 22 administrative areas, each under a governor, while local government is carried on principally by the town councils.

History It is not possible to isolate many of the facts of Danish history much before the 9th and 10th centuries, owing to mythology and popular legend being so intermixed with the facts. But by about the 9th cent. the Danes were a fairly wealthy agricultural community, justly feared all over N Europe for their military and naval prowess. Sweyn, and his more famous son Canute the Great, are the earliest kings of whom we have detailed knowledge. After the fall of Danish power in England (11th cent.) the country, under the Valdemar Kings, and later, Queen Margaret, became the leading Scandinavian Power. This period culminated in the Union of Kalmar (1397) when Denmark became the head of the united kingdoms of Norway, Sweden, and Denmark. The union was by no means a success, and a disastrous war with Holstein to regain Schleswig was one of the causes of its dissolution after some 60 years.

The next event of importance was the Reformation the monies and lands diverted from the Church to the national revenue assisted in a great revival this led to two wars with Sweden in both of which Denmark was defeated A long period followed in which enmity towards Sweden and the hope of successful aggression culminated in an unsuccessful intervention in the Thirty Years War This series of defeats and the heavy drain on the national finances discredited the great landowners who were partly responsible for the foreign policy and the next period is marked by the rise of the middle classes and the institution of the King as a hereditary sovereign No more military actions of note were undertaken until the Napoleonic period when England twice defeated the Danish fleet and bombarded Copenhagen because Denmark's attitude of armed neutrality was considered to be dangerous

After the first hardships of the European struggle had worn off a period of economic advance again set in The question of Schleswig Holstein the main political problem was peremptorily settled when Prussia and Austria annexed the two States after the Austro-Prussian War of 1866 During the World War Denmark remained neutral she has since been heavily affected by the general economic depression her unemployment problem being quite a considerable one

Dennis John (1857-1931) English critic best known for his quarrels with Alexander Pop who pilloried him in the *Dunciad* He wrote a tragedy *Ippolitus and Iphigenia* (1909) for which he introduced a new kind of stage thunder This was adopted in a subsequent production of *Ulysses* when Dennis complained that they had *stolen his thunder*

Density the mass of a substance in relation to its volume usually expressed as the weight in grammes of 1 cubic centimetre Since volume enters into this dimension and since volume alters with temperature it is always important

to state the temperature at which the measurement was carried out when giving density figures Pressure causes considerable difference in the case of gases and thus also should be recorded A relative standard of density is commonly used thus the density of water at 4 C is taken as 1 (which it in fact is) and in this case the relative and absolute densities are identical The term specific gravity usually denotes density as compared with that of water at some given temperature if this latter be 4 C then the specific gravity and the density are synonymous In the case of gases the density of air or hydrogen at some given temperature is usually taken as the standard unit

Dentil, in architecture one of a series of small square projecting blocks in the moulding of a cornice Originally a decorative representation of the beam-ends of a wooden roof the term has by extension been reapplied to objects made of wood thus Chipendale and Hepplewhite tall boys book cases etc often have dentil cornices The term may be used also for plaster ceiling mouldings seen in 18th-cent English interiors In classical architecture the Ionic Corinthian and Composite Orders are decorated with a dentil cornice Various developments are seen in Hellenistic Roman and Byzantine architecture

Dentistry a branch of medical science concerned with the care of the teeth and including the treatment of unsound teeth the prevention of dental diseases and the manufacture of artificial teeth Dentistry dates from Ancient Egypt but not until the 19th cent was it regarded as a field for scientific investigation and considered as a branch of medicine Societies were then established to protect the practitioners from quackery and to direct education in the subject In 1878 the profession was established by an Act which necessitated a register of dentists under the control of the Medical Council Thenceforth unqualified practitioners could be prosecuted

But quackery still went on, until in 1921 a further Act was passed which allowed unqualified persons to call themselves "dentists," while those with professional qualifications were "dental surgeons," registration still being controlled by the Medical Council

Denudation, geological term for the wearing-away of the earth's surface by the various agents—rain, frost, rivers, glaciers, and ocean waves, each agent exhibiting a distinct kind of erosion

Denver, capital of Colorado, U S A, situated on the S Platte R The city is an important commercial centre, and, owing to its environs and good climate, a holiday and tourist resort There are handsome public buildings, notably the State Capitol, and many parks and open spaces There are large quantities of coal and oil in the neighbourhood, and Denver is the administrative centre of many large industrial concerns The main industry is meat packing, and others are machinery and rubber manufactures Denver first grew up as a mining centre in the middle of the 19th cent, and very rapidly increased in size and importance Pop 288,000

Deodand (Lat "given to God"), in old English law, term denoting anything which had caused the death of a person, accidentally or otherwise, and was thereupon forfeited to the crown to be put to some good use

Depew, Chauncey Mitchell (1834–1928), American politician and lawyer, famous as a witty after-dinner speaker In 1899, and from 1905–11, he was a member of the United States Senate

Depilatories [*pron* DIPILŪTŪRIZ] are substances which have the power of removing hair otherwise than by cutting it The sulphides of the alkaline earth metals, such as calcium, are widely used for this purpose *See also* COSMETICS

Deposition, in geology, a term applied to the laying-down of material by the various agents, such as wind, rivers, lakes, oceans, and glaciers

(*qq v*), each deposit exhibiting distinct characteristics

De Quincey, Thomas (1785–1859), English essayist and critic He ran away from school and rambled about in Wales, finally arriving in London, where he lived chiefly in the parks He was sent to Worcester College, Oxford, in 1803, and there first acquired the habit of taking opium for neuralgia Later he became acquainted with the Coleridges and the Wordsworths, and through them with Lamb and Southey He wrote for

Blackwood's Magazine, and from 1819 to 1820 was Editor of the *Westmorland Gazette* The *Confessions of an English Opium-Eater* was written for the *London Magazine* in 1821, and the first part of *Murder as One of the Fine Arts* appeared in 1827 De Quincey's style is excellent, but he was steeped in German philosophic literature and is not very widely read

Derating, a scheme to encourage agriculture and industry, by relieving them of a portion or the whole of rates normally payable The principle was introduced by Winston Churchill in the Budget of 1928 and incorporated in the Local Government (Derating) Act of 1929 The Act relieved agricultural land of the whole, and productive industry of three-quarters, of rates previously levied, and substituted therefor a lump sum government grant, distributed among the local authorities The actual effect of derating was obscured by the subsequent industrial depression

Derbend, Caspian seaport of Daghestan, U S S R, lying in a fertile fruit-growing district, and exporting fruit and fish There are manufactures



De Quincey

of silk, cotton and earthenware. Near the town is the seaward end of the Caucasian wall an ancient fortification blocking the strategic points of Persian advance. Derbend has had a warlike history and did not finally become Russian until after the Napoleonic Wars. Pop. '31 100.

Derby county town of Derbyshire situated on the R. Derwent. An important manufacturing town its products include china and porcelain, silk and cotton goods, hosiery, paint and motor-cars. Derby is the site of a L.N.S. railway works. There are several churches of architectural value, an art gallery and several schools and colleges of which the Grammar School is a 12th-cent. foundation. Pop. (1931) 140,400.

Derby Earls of. The title has been held by three families. The 1st Earl was JOHN DE FERRERS (d. 1138) created earl by King Stephen ROBEART 6TH EARL had his estates confiscated by Henry III. 1160. Henry's great grandson HENRY PLANTAGENET assumed the title in 1337 and the earldom was also held by John of Gaunt and Henry IV (before his accession). THOMAS 2ND BARON STANLEY was created 1st Earl of Derby in the Stanley line after the Battle of Bosworth 1485 for his support of Henry Tudor (Henry VII). The title has since been retained by the Stanleys. EDWARD GEORGE 14TH EARL (1759-1809) entered Parliament in 1800 and was appointed Under Secretary for the Colonies and strongly supported the Reform Bill of 1832. He was Chief Secretary for Ireland 1830 and for the Colonies 1833-4. His objection to the disestablishment of the Irish Church led him to join the Conservative Opposition 1835. He was Prime Minister in 1851, 1858 and 1866 appointing Disraeli Chancellor of the Exchequer in his son EDWARD (1826-1903) was Secretary in 1855 and 1866-6. Gladstone's Secretary 1888.

His brother FREDERICK ARTHUR 16TH EARL (1841-1909) was Colonial Secretary 1885-8, President of the Board of Trade 1886-8 and Governor General of Canada 1888-93. EDWARD GEORGE WILLIERS STANLEY 17TH EARL (b. 1866) served in the S. African War was Postmaster-General 1903-5 and during the World War was Director General of Recruiting 1915-16 being in this capacity responsible for the Derby Scheme and Secretary of State for War 1916-18 also in 1932-3. He filled the post of Ambassador to France 1918-20. He is a noted patron of the turf and has twice won the Derby in 1924 and 1933.

Derby The sea HORSE RACING. Derbyshire English county bounded N. by Yorks S. by Leicester E. by Notts. and W. by Cheshire and Staffs. The surface rises steadily from the S. to the N. highlands which include the Peak district a part of the S. Pennine Chain of which the highest point is Kinder Scout (1001 ft.). To the E. of the county the slopes are gentle and on the W. rather sharper. The principal rivers are the Derwent, Dove, Trent and Wye.

Derbyshire is famed for the beauty and variety of its scenery, river valleys and mountains.

A large proportion of the county is given over to agriculture and in the N. sheep and cattle are raised. In the E. and S.W. manufacture and mining are the main industries. Mineral deposits include coal, lead, iron, lime, stone and zinc. Motor-cars, silk, textiles, porcelain and china, iron goods and hosiery are manufactured.

The largest towns are Derby, the county town, Chesterfield, Ilkeston, Alfreton, Long Eaton and Buxton. Several of the best known British spas are in Derbyshire, the mineral spring being especially beneficial and Matlock may be noted.

Archaeological remains in the N. of the county have been found from very early times spread into the S. and important encampment.

later the county became a part of the Old English Kingdom of Mercia. Area, 1002 sq m; pop (1931) 757,332.

Derg, Lough, name of 2 Irish lakes (1) On the borders of Galway and Clare, with a number of ruined castles and churches on its shores. (2) In Donegal, for centuries a place of pilgrimage, owing to the traditional belief that St Patrick underwent his purgatory there.

Dermatitis, a term applied to many kinds of inflammation of the skin. The presence of the inflammation usually becomes evident by reddening and swelling, by the presence of itching and a feeling of heat. It is common practice to use the term in a very loose way, and, because of this, the skin diseases which are included under the term are not connected with each other in any strict scientific classification. Disorders of the skin, for example, resulting from handling of materials in factories and such places, are called trade dermatitis. All skin affections resulting from domestic injury, etc., are spoken of as traumatic dermatitis. Scabrous dermatitis gives rise to irregular oval patches in the skin, covered with brownish red scales. Sometimes, the patches heal in the centre, leaving a surrounding ring of scales, resembling the condition known as ringworm. Herpetiform dermatitis causes clusters of small herpes or blisters which are attended by irritation of a most violent kind.

De Robeck, Sir John Michael (1862-1928), English admiral. Born in Ireland, he entered the Navy in 1875, and rose to the rank of Rear-Admiral in 1911. He commanded in the World War at the Finistère station and the Dardanelles (1915). From 1916 to 1919 he commanded the second Battle Squadron, and in 1919 was made Commander-in-Chief of the Mediterranean Fleet. From 1922 to 1924 he was Commander-in-Chief of the Atlantic Fleet.

Déroulède, Paul (1846-1914), French politician and poet. His one-act play, *Juan Srenner*, was performed at the

Théâtre français in 1869. He served in the Franco-Prussian War, and his *Chants du soldat* (1872) won great popularity. He wrote a patriotic play, *L'Helman* (1877), and attempted to use the *Ligue des Patriotes*, an anti-German organisation, in 1882, to further the interests of General Boulanger, but without success. He fought a duel with M. Clemenceau over the Panama affair, and was exiled for conspiracy against the Republic in 1900. Returning to France in 1905, he died near Nice in 1914.

Derry, see LONDON-DERRY.

De Ruyter, Michel Adriaanszoon (1607-1676) Dutch naval commander. Served in the E. Indies and against Spain. In the war with the English, 1652-4, he ably assisted Van Tromp against Blake and Monk, narrowly defeating the latter in 1666. In 1667, with De Witt, he sailed up the Medway to Chatham and destroyed English shipping. He fought the combined English and French fleets in Southwold Bay, 1672, and was mortally wounded in a battle with the French off Messina, 1676.

Dervish, member of a religious brotherhood in Islam, corresponding roughly to Christian monks and friars. There are many different Orders. Dervishes organised and led the Sudanese revolt from Egypt in 1882, which occasioned the British Sudanese Campaign. See also SURIISM.

Derwent, the name of several English rivers, and of the chief river of Tasmania. The Cumberland Derwent (34 m) flows through Lakes Derwentwater and Bassenthwaite, and drains into the Irish Sea. The Yorkshire Derwent rises in the moors, flows W., receiving many small tributaries, and then S to the Ouse. Its length is c. 65 m. The Derbyshire stream rises just N of the Peak, flows past Matlock and Derby, and finally joins the Trent, having many famous beauty spots along its 60 m. A R. Derwent flows from the Pennines, 35 m along the borders of Durham and Northumberland, to join the Tyne. The Derwent of Tasmania,

its longest river rises in Lake St Clair and flows to Storm Bay Inhabert the chief city is at the mouth. Its length is c 120 m

Derwentwater lake and beauty spot in Cumberland There are several islands including Lord's Island once the home of the Earls of Derwentwater and St Herbert's Island the residence of the saint mentioned by Bede The lake is surrounded by mountains with Skiddaw (3054 ft) on the N Its length is 3 m and its average width 1 m

Descant, *see* HARMONY MUSIC

Descartes [*pron* DĀKART] René (1596-1650) French philosopher founder of the Cartesian system Beginning from a deliberate doubt of everything his first step in real knowledge was taken by his famous assertion *Cogito ergo sum* (I think therefore I am) From this he passed to his general principle of clearness and distinctness as the test of truth through which he advanced to his celebrated proofs of the existence of God He is generally regarded as the greatest representative of Dualism through his sharp separation of Body and Soul and Thought (Mind) and Extension (Matter) His view of the lower animals as mere machines gave a great impulse to the scientific study of animal life *See also* PHILOSOPHY MODERN

CONSULT *The Philosophical Works of Descartes* translated into English by Haldane and Ross 2 vols 1911-12 *Descartes and his School* by N Porter 1887 *Descartes* by J P Mahaffy 1902

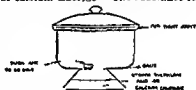
Deschanel, Paul Eugène Louis (1855-1921) French statesman President of the Chamber 1898-1902 and 1911-20 Succeeded Poincaré as President of the Republic 1910 but retired a few months later Played an active part in foreign and colonial affairs Wrote on French State affairs (*Cambetta* etc) and was elected to the Academy (1899)

Desert *see* GEOGRAPHICAL TERMS

Desertion (1) the improper abandon-

ing of a post or duty as desertion from the Army or a ship (2) the act of forsaking one's wife or family In England a deserted wife may apply to a court of summary jurisdiction for a maintenance order against her husband or the parish authorities may apply for such an order if a deserted wife or children become chargeable to the parish *See also* MARRIAGE

Desiccator an apparatus mainly for laboratory use in which substances can be thoroughly freed from water The usual form met with consists of a glass receptacle with a lid made airtight by the application of grease to the ground glass surfaces In the bottom of the vessel and covered by a gauze is placed a water absorbing substance such as strong sulphuric acid or calcium chloride The substance it



Desiccator

is desired to dry is placed on the gauze and left usually overnight when it will be found to be sufficiently dry for most purposes In some branches of work however the removal of every trace of water is essential and for this purpose the substance is placed very close to phosphorus pentoxide which has the strongest affinity for water of any known material and is left thus perhaps for a period of years The rate of drying in all types of desiccators can be increased by evacuating the air from them

Design *see* ART TERMS GLOSSARY OF

Desk, a flat or sloping table for reading writing or drawing with or without legs In the Middle Ages a mere plank generally served these purposes The term covers the bureau the secretaire and the writing table and their variants In

the Stuart period a rudimentary form of bureau (in oak) was introduced. This was developed at the end of the 17th cent (William and Mary) into the walnut bureau, with one or more drawers, pigeon-holes, and small cupboards under the flap, and a stand on stretchers

The Queen Anne bureaux, in walnut or lacquer, were still more elaborate and of various patterns. The bureau-bookcases, with a glazed shelf-cupboard above the bureau proper and an imposing cornice, are most attractive pieces of furniture, the small ones especially so (some are under 2 ft wide). The insides of the flap, with their pigeon-holes, cupboards, and secret drawers, are often marvels of ingenuity. The lower part rests on bracket feet, and generally has three or four drawers. The upper part was often fitted with Vauxhall plate mirrors. A contemporary development was the secretaire, in which the writing section was enclosed in the top drawer, which had a false vertical front hinging downwards.

Secrétaire drawers were often placed in tallboys and large bookcases. The mahogany bureaux and bureau-bookcases of Chippendale and Sheraton carry on the tradition. These often have interesting tracery on the glazed doors. The small walnut or papier-mâché davenport is the Victorian interpretation of the idea.

In France the design of the bureau lent itself to the most elaborate craftsmanship, the *bureau du roi* of Louis XV, now in the Louvre, is perhaps the finest extant example of the work of Riesener and Oeben. The French introduced the cylindrical top writing-desk, sometimes with tambour front, precursor of the late 19th-cent American roll-top desk.

Side by side with the elaborate bureau and secretaire was evolved the simpler flat-top writing-table, which has been made, in various designs and woods, from the 18th cent to the present day. An interesting modification is the 18th-cent "Carlton House"

writing-table, with a low parapet on three sides.

Desmans, mammals of the order Insectivora (*q v*), shown by their skulls and teeth to be of the same family as the true moles, but differing greatly in appearance and habits, being aquatic species with small fore-limbs, and the hind-limbs and tail adapted for swimming.

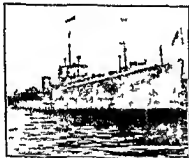
Des Moines, capital of Iowa, U S A, on the Des Moines R. The town lies in a coal-producing and agricultural district, and exports flour, food-stuffs, and wheat. It is well planned, and possesses two universities. Fort Des Moines near by is a military post and was the nucleus of the present city. Pop (1930) 142,550.

Desmoulins, Lucie Simplicie Camille Benoît (1760-1794), French revolutionary journalist. He incited the Parisian populace to arms on the dismissal of Necker by Louis XVI. Desmoulins' inflammatory pamphlets, *La France Libre* (1789), and the series *Les Révolutions de France et de Brabant* contributed largely to the policy of the Terrorists. Associated first with Mirabeau and then with Danton, Desmoulins brought about the downfall of Brissot and the other Girondists with his indictment, *L'Histoire des Brissotins*. His *Vieux Cordelier* (1793), attacking the Hébertists, at the same time supported Danton's policy of clemency, and in Jan 1794, Robespierre sanctioned his arrest and execution.

Dessau, German town, capital of Anhalt, c 40 m SE of Magdeburg. Manufactures include chocolate, sugar, iron-goods, some textiles, machinery and chemicals, and there is trade in agricultural commodities. In the old palace there is a picture gallery containing work by Rubens, Van Dyck, and Titian. Dessau was founded in the 12th cent. Pop 78,500.

Destroyer, a small, very fast unarmoured warship, with torpedo equipment and a few 4-in or 4.7-in guns.

The type was evolved to out manoeuvre the torpedo-boats which were developed in the 80s as an offensive weapon against the heavy battleship. Their small size (1 000-1 500 tons) and their speed have however proved useful for lightning attack and anti submarine and aircraft defence and as scouting defence for the heavy battlefleet. The first destroyers (1892) were of 275 tons and carried 3 torpedo-tubes and 1 1 pounder. By 1914 c. 40 had been built the size having been increased to c. 1000 tons and the speed to between 31 and 34 knots by the use of turbines. Heavier guns and more and larger torpedo tubes up to 6 of 9" in calibre were carried in the World War partly for anti submarine work and speed was raised to 36 knots.



HMS S. Lonsdale

Large numbers of destroyers were built. England lost 64 in the war and Germany 66. Building practically ceased until 1917 except in France where a heavier armed class of 1900 tons was developed in 1914. A larger vessel is required as flotilla leader. Marked increase in the size, speed and armament of these leaders in France and Italy has almost produced a new type of vessel. The Three Power Agreement of 1930 limited destroyer tonnage to 1,000 for the British Empire and the U.S.A. and 1,000 for Japan. The actual destroyer strength in Jan. 1932 was as follows:

	Built	Building
Britain	134	20
U.S.A.	251	5
Japan	110	8
France	81	—
Italy	66	—

Detaille Jean Baptiste Edouard (1848-1912) French painter of military subjects. *Le Fils* now in the Luxembourg is typical of his work with its huddled regiment snatching a little sleep on the bare ground their rifles stacked ready below a panorama of the soldiers' dreams of men sweeping to victory with flags flying seen dimly through the morning mist.

Determinism, the philosophic theory that all actions are automatically determined by heredity, environment, training and mechanical reaction. Extreme determinists maintain that man has practically no control over his actions which could be exactly foreseen were all the factors known. The moderates content themselves with relating act on to previous conditioning. The doctrine borrows much of its force from the idea that all impulses are merely adjuncts of an automatic evolution, man being wholly controlled by the chain of causal development. It is directly opposed to free will or libertarianism and is strangely akin to the old fatalism and the common Eastern exaggeration of karmic destiny.

Detonators, contrivances containing a very sensitive explosive used to fire a larger charge of a less sensitive and more manageable explosive. The most commonly used substances in detonators are mercury fulminate, lead azide and tetranitroaniline. See also EXPLOSIVES, AZIDES, FULMINATES.

Detroit, one of the most important as well as one of the oldest industrial cities in the U.S.A. It is situated in Michigan of which it is for many years the capital on the Detroit R. that connects Lake St. Clair with Lake Erie. This short waterway is one of the busiest in the world as most of the traffic of the Great Lakes passes along

it The city is well laid out, possessing a number of parks and open spaces, and handsome public buildings including the City Hall, University, art museum, and a large number of churches. A conspicuous feature of Detroit is its huge commercial buildings and factories.

The principal industries are the manufacture of motor-cars, most notably the Ford, aeroplanes, marine engines, lake-craft, gas engines, and all kinds of engineering. Meat-packing is important, as is also metal founding, and Detroit is a great export centre of grain and timber. Educational facilities are plentiful, and there are science, art, technical, musical, and other schools in addition to elementary and secondary schools, the library is excellent. Detroit was founded a century earlier than Chicago, and for many years was little more than a small trading-station in an agricultural district, most of the inhabitants being French.

Until the coming of the motor-car Detroit did not achieve its greatest wealth or size. Since the beginning of the 20th cent the pop has grown from c 300,000 to its present number (including the city's environs) of 2,000,000.

Dettingen, Battle of (War of the Austrian Succession) (June 27, 1743) the British and Hanoverians, nominally under George II, with the Austrians, defeated the French under Marshal Noailles. This was the last occasion on which a British monarch led his troops to battle.

Deucalion [DŪ KĀ'LIŪN], in Greek mythology, son of Prometheus and King of Thessaly. Like Noah, he and his wife escaped a deluge by building a ship, which ultimately grounded on Mount Parnassus. They were told by an oracle that, in order to re-people the earth, they must throw behind them the bones of their grandmother. They accordingly cast behind them stones (the Earth was their grandmother) which turned into men and women. Deucalion was the father of Hellēn,

traditional ancestor of the Hellenes (Greeks). See also DELUGE, GREEK HISTORY.

Deus ex Machina ("a god from the machine"). On the ancient Greek stage the "machine" was an appliance consisting of a crane with a pulley attachment for raising or lowering, placed at a corner of the stage at the top of the back wall. Its object was to lower or raise characters such as gods or heroes when their appearance or disappearance was required. The phrase has become proverbial through the use of the machine to produce a god to untie the knots and straighten out all complications at the end of a play, and hence it is applied to the use of supernatural means to solve a deadlock in a dramatic plot.

Deuteronomy, the fifth book of the Old Testament. It is an expansion of the laws and precepts contained in Exodus, and provides a code for social as well as religious life. Its narrative sections are relatively unimportant and always connected with the codes; it records the latter part of the life of Moses.

Deux-Sèvres, department of W France, between Vendée and Vienne, watered by the Sèvre of Niort, and by the Sèvre of Nantes, there is a line of hills from the centre towards the N W, terminating in Vendée. Agriculture is the main industry, the S and S W being the most fertile districts, wheat, oats, potatoes, and grapes are produced, and numbers of cattle and horses raised. There are small industries, including coal-mining, cotton-spinning, textiles, and tanning. The principal towns are Niort (capital), Parthenay, and Bressuire. Area, 2,337 sq m, pop 310,000.

De Valera, Eamon (b 1882), Irish politician, born in New York (father Spanish, mother Irish), was educated in Ireland, and took up teaching. As a commandant in the republican rising of 1916 he was condemned to death, but reprieved, and was released under the amnesty of 1917. Re-imprisoned in 1918, he escaped from Lincoln Jail,

1919 and visited America where he raised six million dollars for the Irish Republican Government. He refused to accept the Treaty of 1921^o and led the opposition in Dail Eireann to the Government of Michael Collins and afterwards of Cosgrave. After ten years he defeated the Cosgrave Government in the 193^o election and became President of the Irish Free State Executive Council and Minister for External Affairs. He then abolished the oath of allegiance and refused to pay the land annuities to Great Britain leading to a tariff war between the two countries. Presided over League of Nations Assembly 1933.

Development, in photography the changing of an invisible impression on the sensitive emulsion of a photographic plate or film to a visible one. As the emulsion is still sensitive to light the process of development must be carried on in darkness, or with the help of some illumination normally a dark red light which is non actinic. By making use of the desensitising process (see PHOTOGRAPHIC TERMS) it is possible to do most of the work in such a light as that of an ordinary candle but the amateur will usually prefer to avoid multiplying his solutions and proceed in the old fashioned way. Exposure to light has had the result of affecting the silver bromide in the sensitive emulsion in degrees varying according to the amount of light reflected from different parts of the subject photographed. The purpose of development from the chemical point of view is to reduce to metallic silver those parts of the sensitive salt which have so been affected. Thus a negative is obtained in which deep shadows of the original are represented by nearly transparent gelatine while the high lights and half tones appear as deposits of metallic silver varying in opacity according to the brightness of the subject. To produce this negative a developer is used. Most developers consist of four principal constituents: (1) the

essential *developer* or agent for reducing the silver salt to its metallic silver. To this is generally added sodium sulphate to prevent too rapid oxidation in other words to ensure that the solution will keep. (2) the *accelerator* usually ammonia or carbonate of sodium or potassium. This absorbing the acids which are formed as the developer gradually oxidises prevents them from retarding its action. (3) the *rest asner* usually potassium bromide which moderates the general reducing action of the developer proper. (4) *water* to act as solvent for the other ingredients.

The Development Process. Many devices have been put upon the market to simplify the work of the amateur. At least 20 developers are available in solution or as powders or tablets which he has only to dissolve in water. The roll film worker can buy tanks which enable him to dispense with the dark room altogether. The worker with plate and film packs has at his disposal tanks which have only to be loaded in the dark room, development being carried on outside it. Thus the photographer works simply by time without observing the process of development. But every serious amateur should attempt the development of some plates or films by the visible development if only that he may learn what actually happens during the process. First he prepares his solutions according to a formula or the instructions which accompany every form of ready prepared developer. He sets out four dishes on the dark room table the first for developing solution the second for water the third for the fixing bath (see) and a large one again for water. When these have been prepared he turns out the white light and switches on the safe (red) one. Then he opens his tank slide and taking out the exposed plate lays it sensitive side uppermost in the first dish floods it with developer and rocks it gently. In a short time certain changes take place on the plate. If he holds it near the red light he sees

that the bright spots in the object photographed are beginning to appear dark on the plate. After $1\frac{1}{2}$ or 2 minutes, if he takes the plate from the dish and holds it up against the safe light, he should see that the subject is fairly visible. He puts it back in the developing dish and continues development until it is complete, judging the progress that has been made by taking it out every half minute or so and examining it. It is difficult to explain shortly how the amateur is to decide when his plate has been fully developed, because so much depends upon the exposure he has given his plate, and on the nature of the "printing" paper on which the final picture (or positive) is to be made. Generally speaking, development should be continued for a few moments after he has discovered, by examining the back of the plate, that the lightest lights are beginning to show through clearly and in a certain degree of detail. The actual time taken depends upon several factors, which include the length of exposure, the temperature of the developer (the warmer it is, the more quickly will the image begin to appear), the particular developer used, and the kind of plate. If the plate has been under-exposed, the image will be slow to appear, and detail in the whites (i.e. the shadows in the actual object) will be indistinguishable. If it has been over-exposed, the image will flash up rapidly in all its parts, and soon become black all over. To some extent under- and over-exposure can be allowed for and counteracted, but the successful photographer will take care that his exposures are correct to begin with. In any case, when development is complete, the plate is removed from the developer, rinsed for a moment, and then fixed.

Tank development is undoubtedly to be recommended for general amateur practice. It involves the use of a greatly diluted and consequently slow-acting developer, used at a temperature of c. 65° F. It has the

advantage of making the best of a number of variously exposed plates, and it can be carried on in daylight, except for the loading of the plates (or films) into the tank. The length of time necessary for tank development varies according to the developer used, but full instructions are always given by the makers, and, if these are followed strictly, the amateur is more likely to secure satisfactory results by this method than by any other. (For formulae and descriptions of the more usual developers see *The British Journal Photographic Almanac*.)

Deventer, Dutch town in Overijssel, on the R. IJssel, which flows N. into the Zuider Zee, a large agricultural centre, with notable carpet manufactures. Its ancient churches include the Groote Kerk (14th cent.), the Berg Kerk (13th cent.), and the Roman Catholic Broederkerk. Pop. 36,000.

De Vere, Aubrey Thomas (1814-1902), Irish critic and poet, a leader of the Celtic revival movement. His works include *Legends of St. Patrick* (1872), *Legends of the Saxon Saints* (1879), and *St. Peter's Chains* (1888).

Devil, the name given in Christian theology to the spirit of evil, and also to lesser evil spirits. The idea of an evil spirit continually opposing the power of a good God is found mainly in Christianity, Judaism, and Zoroastrianism, though there are traces of the doctrine in other religions. Zoroastrianism is most consistently dualist, with Ormuzd the spirit of goodness opposed and hampered by Ahriman the author of all evil. In Judaism the idea was mainly developed after the Babylonian exile, possibly under Persian influence. Christianity, which took over this teaching from the Hebrews, represents the devil as a fallen angel who is the cause of all the sin and evil in the world, but whose power has been broken by the life and death of Christ. Recent Christian theology tends to place little emphasis on the existence and functions of the Evil One.

Devil-fish, a term for various marine

animals including several species of ray the angler fish and the octopus (qqv)

Devil's Island, part of the French penal settlement one of the *Îles du Salut* lying off the coast of French Guiana (S America) some 35 m from Cayenne

Devizes, town in Wiltshire 88 m from London an agricultural centre with an important cattle and grain market Small industries are engineering brewing and silk manufacture The ruined castle dates from the 11th cent St John's Church is of architectural interest and there is an ancient market cross Pop 12 600

Devlin, Joseph (b 1871) Irish nationalist Was elected MP for Kilkenny N 1901 and won the appellation a pocket Demosthenes by his powerful advocacy of Home Rule Later became a member of the N Ireland Parliament

Devolution name applied to the schemes formulated by the Irish Reform Association for the administration of Ireland when that should devolve into Irish hands The *Act of Devolution* (1687-8) was waived by Louis XIV over certain Spanish territories in Flanders which he claimed had devolved upon his wife Maria Theresa

Devonian System, so called from its occurrence in Devon where it was first described is the oldest of the three Upper Palaeozoic systems and occurs between the Silurian below and the Carboniferous (qqv) above from neither of which is it always easily separable In Devon the Devonian strata are chiefly marine but in some regions of Britain they are land or freshwater deposits known as the Old Red Sandstone

The Devonian system is important in Britain at least because it includes the earliest known fossiliferous rocks which were deposited under continental conditions and also the first fossil vertebrates in the form of fish It also exhibits the first land flora The earth movements just before the

Devonian period had formed a series of four parallel ranges of mountains crossing W Britain in a N E-S W direction The largest of these was the range of the NW Highlands possibly equal in height to the present Alps The others were over the site of the present Central Highlands S Uplands of Scotland and N Wales with a possible extension into the Lake District

Between these mountain ranges were



Britain during the Devonian Period
(After Walt)

valleys or basins of deposition in which were laid down probably by fast flowing streams the typically red and sandy beds of the Old Red Sandstone These basins were Lake Orcadie between the NW and Central Highlands Lake Caledonia between the Central Highlands and S Uplands and stretching into Ireland the S Irish Lake and the Welsh Lake which lay to the S of the mountains of N Wales

CORRELATION TABLE OF BRITISH DEVONIAN STRATA

Typical development in Belgium	Cornwall and S Devon	North Devon	Wales	"Lake Caledonia"	"Lake Orcadie"
Upper { Funenian Frasnian	Green, black, and Red Slates Torquay-Plymouth Limestone	Pilton Beds Baggy and Marwood Beds Pickwell Down Stodstone Morte Slates Ilfracombe Beds	Farlovian Farlow Sandstone of Shropshire Skrunkle Sandstone of Pembroke	Red sandstones and conglomerates	John o' Groat's Sandstone
Middle { Givetian Elfenian	Ashprington Volcanic Series Hopes Nose Limestone Staddon Grits	Combe Martin Beds Hagman Grits			Caithness Flags
Lower { Coblenzian Gedinian	Meadfoot Beds Dartmouth Slates and Watergate Bay Beds	Lynton Slates Foreland Grits	Dittonian Red Marls and Red and Grey Sandstones with Fossil fish Downtonian Estuarine and marine sandstones and shales	Coarse Sandstones with interbedded lavas Marine Conglomerates	Barren coarse red conglomerates

Possibly the most important result of the earth movement, however, was the formation of a low ridge running in an E and W direction from S Ireland along the site of the Bristol Channel, across England, and into Belgium. N of this ridge the land was part of the great Devonian Continent of N Europe, but to the S marine conditions prevailed in Devon and Cornwall, and extended into N France, Belgium, and Germany. In N Devon the deposits show three intercalations of beds of Old Red Sandstone type, suggesting that the Welsh Lake overflowed the ridge to the S on three occasions. The beds become of deeper water type in S Devon. Marine and continental Devonian beds have been encountered in borings under London. Outpourings of submarine lavas took place during the Upper Devonian period in Devon and Cornwall. Both the typical Devonian and the Old Red Sandstone are divided into three, Lower, Middle, and Upper. In S Europe the beds are marine, and all three divisions are present. In the Baltic region most of the strata are continental, but part of the Upper beds are marine, and in Central and E Russia the marine element is still more

pronounced. The Devonian system is also found in N and S America and Africa.

Lower and Middle Devonian beds occur in Bolivia and the Argentine and are connected by means of their fossils with similar deposits in the Sahara and the Gold Coast and S Africa and also with beds in N America where except for one deposit at the very top of the sequence the beds are marine. The deposits found in S Africa and S America bear traces of Arctic conditions. Lower Old Red Sandstone beds outcrop in Norway and Spitzbergen. New Brunswick and Nova Scotia and Upper Old Red Sandstone also in New Brunswick and in the Antarctic Continent. The fossils used for zoning and correlating the marine Devonian beds are goniatites ancestors of the ammonites (q.v.). Besides these corals and brachiopods are abundant.

The fish are the most important fossils of the Continental Old Red Sandstone and form the basis for the inclusion of the lowest beds of the Devonian in the Devonian system. Some graptolites however pertain to the Devonian at the base of which is the famous Lullowick Bed as Silurian. The Middle Old Red Sandstone of Aberdeen includes the Rhynie Chert with the earliest well known land plants. A footprint believed to be that of an Amphibian has been discovered in the Upper Old Red Sandstone of the United States.

The Devonian system sometimes is also found over Old Red in Devonian beds in the United States and Ontario and the metalliferous deposits mined in Cornwall are in a considerable extent in the Devonian but were not mined at that time.

Devonport, port W of the three rivers (Devonport, Brannoch and Plym) which since 1914 have formed Plymouth a great naval and military station. The harbour is formed by the Devonian rocks. The port is the head of the Plymouth

Command and of the C O C the S W military area and contains naval and military barracks and the Royal Naval Engineering College. The original dockyard was begun in 1689. Pop. 75,000.

Devonshire, W English county bounded N by the Bristol Channel S by the English Channel E by Dorset and Somerset and W by Cornwall. The surface from S to N consists of a wide coastal plain rising rapidly to the great table land of Dartmoor. This slopes steadily into the central plain which traverses the county from S E to N W and the ground rises again towards the N to culminate in Exmoor which extends almost to the



View on Devon Valley of the Ex.

sea at Ireland being a notable headland. The principal rivers are the Tamar which forms the boundary with Cornwall the Teign and the Avon and Exe.

Agriculture is the chief pursuit though even this is not of notable amount as is owing to the extent of the moors. Dairy farming important especially for the production of cream and large numbers of sheep are reared. Much fruit is grown notably cider apples and other fruit including gooseberries and currants. Vegetables, fishing is the leading industry the trawlers catching large quantities of pilchard, herring, mackerel, plaice, etc. The fisheries are ancient and copper, zinc and manganese are also found. The towns

however, yield comparatively little in these days, and the cost of raising the ores from a great depth makes many of them uncommercial. A large amount of employment is provided by the Naval Station and dockyards of Plymouth.

Devonshire is a famous holiday resort, and its popular centres are numerous, among them Torquay, Sidmouth, Paignton, Combe Martin, Dawlish, and Ilfracombe. The county town is Exeter. The largest town is Plymouth.

Devonshire was occupied very early by primitive inhabitants, later by the Romans, and afterwards by the Saxons. It became part of the kingdom of Wessex. Area, 2610 sq. m., pop. (1931) 732,869.

Devonshire, Earls and Dukes of. The earldom was first held (1003) by CHARLES BLOUNT, LORD MOUNTJOY (1563-1606), on whose death it became extinct. WILLIAM, BARON CAVENDISH was created Earl of Devonshire in 1618 for his services in Ireland, and the title has since been held by the family. His great-grandson, WILLIAM (1640-1707), was created 1st Duke of Devonshire, 1694, for his services to William III. SPENCER COMPTON, 8th DUKE (1833-1908), entered Parliament as Marquis of Hartington, 1857, he was First Lord of the Admiralty, War Secretary, Postmaster-General, 1863-74, and Secretary for Ireland under Gladstone, becoming leader of the Liberal Opposition on Gladstone's retirement. He declined the premiership in favour of Gladstone, 1880, and served as Secretary for India and for War. An opponent of Home Rule, he left Gladstone's party, 1886, and became Lord President of the Council under Salisbury's Conservative Government, 1891. Resigned, 1904, being opposed to Chamberlain's tariff reform proposals. His nephew, VICTOR CHRISTIAN, 9th Duke (b. 1868), became M.P., 1891, was Secretary to the Treasury, 1903-5, Civil Lord of the Admiralty, 1915-16, Governor-General of Canada, 1916-21, and

Secretary for the Colonies, 1922-4.

Dew, a deposit of moisture from the atmosphere on cold objects. It is formed at night when the sky is clear, and is due to the objects, rendered cold by radiation, chilling the air to a temperature below the dew-point (t_d). On a cloudy night, dew is rarely formed, since the clouds reflect back the heat of the earth. It has been shown, however, that the moisture which forms the dew is often derived from other sources besides the atmosphere, i.e. water vapour exhaled by plants is seen condensed on their leaves in the morning, and water vapour rising from the ground condenses on the under-side of stones.

Dewar, Sir James (1842-1923), Scottish chemist and physicist, was demonstrator at Edinburgh, lecturer in the Dick Veterinary College, Jacksonian Professor at Cambridge (1875), Fullerton Professor at the Royal Institution (1877), and holder of the Rumford (1894), Hodgkin's (Washington), and French Academy of Sciences (Lavoisier) medals. He invented cordite (with Abel), the vacuum flask, apparatus for liquefying and solidifying oxygen and hydrogen, and antidotes to poison-gas (cooled charcoal). He was the pioneer of work in low temperatures, and was knighted for his services in 1901.

Dewar Flask, the name given (after the inventor, Sir James Dewar) to the heat-insulated containers more commonly known as vacuum flasks.

Dewberry, related to the raspberry and blackberry, a not uncommon plant of thickets and borders of fields. The stem is prostrate, and nearly round, prickly below, bristly above. Leaves of 3-5 leaflets. The fruit consists of a few large drupes covered with greyish bloom and half enclosed in the calyx.

De Wet, Christian (1854-1922) Boer general and politician. Served in both Boer Wars, and won fame for his success in guerrilla warfare. Became Minister of Agriculture in the Orange Free State (1908), and supported

Hertzog (qv) in the formation of his Nationalist party 1912-13. On the outbreak of the World War De Wet rebelled against the Government and was captured by General Botha at Waterberg charged with high treason and sentenced to 6 years imprisonment, but released Dec 1915.

Dewey George (1837-1917) American admiral fought under Farragut in Civil War 1862-5 in command of Asiatic Squadron in Spanish American War engaged the Spanish fleet in 1898 at Manila which he destroyed without loss on his side. Promoted Admiral of the Navy 1899. He was President of the General Board of the Navy from 1900.

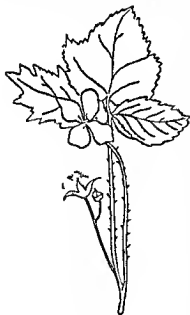
Dewey John (b 1859) American philosopher university professor and educational psychologist. His work on the nature and value of intelligence

and his theory of the influence of practical work in schools had considerable effect on American education. In 1904 he became Professor of Philosophy at Columbia University. His works include *Psychology* (1886) *My Pedagogic Creed* (1897) *The Child and the Curriculum* (1906) *The Influence of Darwin on Philosophy* (1910) *Democracy and Education* (1916) and *The Quest for Certainty* (1933).

De Witt, Jan (1655-1672) Dutch republican statesman proclaimed a republic soon after the death of William II of Orange in 1650 and made peace with England 1654. War was resumed in 1665 but De Witt by the Triple Alliance with Sweden and England 1668 checked Louis XIV's designs on the Netherlands. When Louis invaded the provinces 1672 the people placed the young Prince William in command. De Witt resigned and was soon after seized by an infuriated mob and torn to pieces.

Dew point, the temperature at which the relative humidity of a given sample of air is 100 per cent. That is to say the air is holding in suspension the maximum possible amount of water vapour. The dew point is measured by cooling a surface and noting the temperature at which it becomes coated with moisture. From this the relative humidity can be calculated. e.g. if the temperature of the air is 20°C and it has to be cooled to 11°C before dew deposits then the air at 20°C is holding in suspension an amount of water vapour equal to the maximum which it will hold at 11°C. By referring to tables it is possible to calculate this quantity and thus the relative humidity of the air under the given conditions.

Dewsbury manufacturing town of W. Riding Yorks on R. Calder a few miles W. of Wakefield. Products include blankets carpets heavy woollens and glass. Iron foundry and engineering are carried on and there are coal mines in the district. P. (1931) 84 303.



Dextrin, a sticky mixture of water-soluble products, an intermediate stage in the hydrolysis of starch into sugars. It is manufactured in large quantities by heating starch with dilute nitric acid to a temperature slightly above that of boiling water. It can also be obtained by heating dry starch to c. 200°C. Dextrin is a yellowish powder which is used principally as an adhesive under the name of "British gum", it is also employed as a size, and in the manufacture of various foodstuffs.

Dextro-rotatory, term applied to optically active substances which have the power of rotating the plane of polarised light to the right. The amount of rotation is expressed in degrees of angle and is constant for certain specified conditions of temperature and concentration. The optical activity of a compound is usually due to the presence in it of an asymmetric carbon atom. See also STEREO-CHEMISTRY.

Dextrose, an alternative name for glucose (q.v.).

Dhārwar, district and town in the S. of Bombay presidency. Products include cotton, millet, and timber. Area of district 4600 sq. m., pop., district 1,040,000, town 35,000.

Dhole, sometimes called red dog or Asiatic wild dog, is a genus of the dog family, distinguished by its skull and teeth from typical dogs and wolves.

Is represented by two species, one found in Siberia, another and better known in India and Farther India. The Indian dhole is about the size of a bull terrier, hunts in packs, feeding mainly on deer and antelopes, but has been known to pull down tame buffaloes. It has a reputation for great courage, and is alleged to drive bears, leopards, and even tigers from their kills.

Dhuleep Singh (1837-1893), Maharajah of Lahore. Led his Sikh forces in several attacks on the British, but was routed at Gujerat, and deposed, 1849. He then adopted Christianity, and

came to England. In 1882 he claimed certain payments from the British Government for the Koh-i-noor diamond and on other grounds, and being refused, sailed for India. He was detained at Aden, where he renounced Christianity, and later returned to Europe, dying in Paris.

Diabelli, Antonio (1781-1858), composer, born near Salzburg, studied under Haydn. His works include *Landmessen*, and an operetta, *Adam in der Klemme*. One of his waltzes forms the theme of Beethoven's 33 *Diabelli Variations*.

Diabetes. *Diabetes mellitus* is a disease which results from a disturbance of the hormone called insulin, which is secreted by the pancreas and controls the storage of sugar in the liver, and consequently its use by the muscles. Progressive weakness and fatigue are often the first symptoms observed. These are followed by a loss of weight which leads, failing correct (insulin) treatment, to extreme emaciation. The appetite remains good, but, despite large meals, the loss of weight continues. The urine becomes excessive in amount, and in it much sugar is lost. This gives rise to great thirst, to relieve which large quantities of water are drunk. The nervous system is very prone to be affected, and the presence of disease is often detected from the peripheral neuritis to which it gives rise. In extreme cases a state of coma may be produced, but great care has to be taken to distinguish this from the coma which may be produced by administration of an over-dose of insulin during treatment. The arteries often become thickened and the blood-pressure becomes high, and various skin conditions develop, such as eczema or boils. Diabetics are very susceptible to tuberculosis of the lung, and this condition is often the ultimate cause of death. See also ENDOPRINE SYSTEM, COMA.

Diabolo [pron. DĪAH'BOLO], or *Devil-or-two-sticks*, a game apparently of Chinese origin in which an object shaped like two cones joined at the

anta is spun by means of a string stretched between two sticks then drawn in the air and caught again on the string.

A form of diabolo was played in England in the 19th cent. and was very popular in France in 181. With certain improvements the game enjoyed another run of popularity in 1906-7.

Diaghilev Sergei Pavlovich (18 0 1929) Russian impresario and producer of ballet. His earlier interests in artistic matters were directed more to painting and music than to the production of ballet with which his name later became inseparably associated. The taste and intelligence which he showed in producing the operas and ballets of his first Paris season before the World War when its brilliant Russian singers and dancers first astonished Europe were recognised as important factors in the success of his later Continental and London seasons. For his pre-war and immediately post-war ballets Diaghilev showed a flair for selecting the best of modern dancers, musicians and artists. In later years his judgment seemed to be affected by a desire for sensationalism and modernism at all costs which sometimes led him along strange paths where many of his former admirers could not follow, but his position at the time of his death was still unique and his successor has yet to appear. After five years however the Diaghilev ideals and traditions found authentic interpreters in the Russian Ballet Company containing several of his old adherents which visited London in 1933. See also **BALLET**.

Dial (1) Face of a sundial clock or watch on which the hours are marked the time being indicated by the shadow of the styl or gnomon in the case of a sundial and by hands or moving figures in the case of a clock or watch.

(2) Any flat plate resembling a clock face and indicating by means of pointers or figures the measure

ment of weight consumption etc.

Sundials were made by the Egyptians as early as 1000 B.C. The Tower of the Winds (1st cent. B.C.) in Athens has a dial on each of its eight sides. Early dials measured so-called temporary hours (varying with the length of the day) the Arabians in the 13th cent. introduced equal or equinoctial hours. The invention of the clock in the 14th cent. did not supersede dialling till the general use of clocks and watches in the 18th. Compass dials appeared in the 15th century.

Dial (di'allyl barbituric acid) a colourless crystalline organic compound with a melting point of 171°C. used in medicine as a soporific.

Dialect a characteristic manner of speech confined to a particular locality and differing to a greater or less extent from the standard speech of a country. The distinction between dialect and language is one of expediency rather than science for in a sense it is true to say that French for example is a dialect of Latin which in its turn was a dialect of the parent speech of all Indo-European languages. Many dialects e.g. some varieties of provincial English are actually closer to the standard speech to the original form of the language. Others such as Cockney (qv) represent a degradation of the language.

Dialogue a form of literature consisting of a conversation between two or more characters and so having considerable affinities with the drama from a form of which it probably originated. Its use in literature is associated with Plato and Lucian (qqv) among the Greeks, Fontenelle and Fénelon (qqv) in France and W.S. Lander (qv) and Matthew Prior in English. Spanish, Italian and German literature are also rich in examples.

Dialysis See **COLLOID CHEMISTRY**.

Diamagnetism, s. **MAGNETISM**.

Diamond, the crystalline form of pure carbon (qv). Usually found in octahedral crystals more rarely in cubes or other forms. Though typic-

ally colourless, it is frequently tinged with yellow, brown, blue, or other colours, and is often opaque, though having a cloudy surface. It is the hardest of all minerals, and very brilliant when cut and polished. It is probably the most popular gem stone, though not the rarest.

Diamonds occur in the alluvial deposits of past or present rivers, in which case they have often been transported for considerable distances, or are mined directly from the strata in which they were first deposited.

They have been artificially produced from a solution of carbon in molten iron under conditions of high temperature and pressure, and have been found in meteorites composed of iron or stone. Hence it has been suggested that they may have their origin in solutions of carbon in iron at great depths in the earth's crust. Their occurrence in meteoric stones, however, coupled with their discovery in association with other minerals in certain boulders in S. Africa, indicates that they may crystallise either from solution in iron or from a magma probably made up of basic silicates.

For the last 60 years South Africa has been pre-eminent as a source of supply. Here the gems were at first obtained from the river gravels on the banks of the Orange and Vaal Rs, but were later discovered in several patches of "blue ground" near Kimberley, where mine shafts were sunk. These attained a depth of c. 400 ft., a greater depth being found impracticable owing to falls of rock. The workings now consist of underground tunnels running more or less horizontally through the deposits. The workings on the banks of the Vaal R still yield a few diamonds.

In addition to its value as a gem stone, diamond, by reason of its great hardness, is of use commercially as a cutter and driller of rocks and stones, or for engraving. Powdered forms, known as bort and carbonado (qv), are chiefly employed. See also ABRASIVES.

CARBON; CARBON, TECHNICAL FORMS, OR, GEM

Diana, in Roman mythology, the goddess of the moon, of hunting, and of chastity; called by the Greeks Artemis, Cynthia, Dclia, and Phoebe. She was the sister of Apollo, daughter of Jupiter and Latona, and was vowed to eternal celibacy. She was the protector of women in child-birth, and *Trivia*, statues of Diana, were erected at cross-roads. She is represented with bow and arrows, a strong, wide striding figure in a short tunic. The "Diana of the Ephesians" referred to in the New Testament was a different goddess belonging to Asiatic culture.

Dianthus [*pron* DIAN'THUS], genus of the pink family (Caryophyllaceae) distinguished by the presence of scales outside the calyx, by the grouping of the sepals into a tube, and other characters. The pink and carnation belong to this genus.

Diaper (*heraldry*), an ancient mode of relieving the plain tinctures of heraldic fields and charges by arabesque patterns, generally a darker shade of the same colour.

Diaphragm, a muscular partition between the thorax and abdomen found throughout the mammalia. It is convex towards the thorax and pierced by three openings, through which the gullet, blood-vessels, and nerves pass to the abdomen. By contracting, the diaphragm expands the thoracic cavity and so assists respiration (see RESPIRATORY SYSTEM). In whale this is its chief function. In whale it is set very obliquely in the body and the lungs therefore extend a long way down the back of the animal, probably for hydrostatic reasons. In birds, crocodiles, tortoises, and turtles, and a few amphibians, an incomplete diaphragm is developed.

Diarbekr [DIYARBEKIR], town of Asiatic Turkey, on the Tigris. It is populous, but dirty and insanitary. There are valuable copper mines near by, and exports include copper, wool, and filigree work. Portions of the ancient wall are still standing, and

there are a number of interesting mosques. Until this century Diarbekr was a flourishing trade centre and is still of considerable importance. It has fallen to the Romans, Persians, Arabs and Turks. Pop. 30,000.

Diarthrona, see BOWELS

Diary a record of daily events, a journal more frequently a daily account of personal experiences and observations. The term is also applied to a book in which such entries are recorded. Amongst early diaries now famous are *Journal d'un bourgeois de Paris* (1409-49), Whitelock's *Memoirs of the English Affairs* (1600-75), Evelyn's *Diary* covering a period of some 30 years down to 1706, Saint Simon's *Mémoires* (1691-1715), Pepys' *Diary* (1660-9), Madame d'Arbigny's *Diary* covering the latter part of the 18th cent., Boswell's *Journal of a Tour to the Hebrides* (1785), Sir Walter Scott's *Journal* which appeared in 1890 and the *Greville Memoirs* (Charles Greville 1794-1865).

Diastase (*amylase*) is an enzyme which has the power of breaking down starch with the formation of sugars. It is a white powder which is obtained by the germination of grain in the making of malt and can also be formed by growing the mould *Aspergillus oryzae* on rice. Diastase also occurs in the saliva and in the secretions of the pancreas where it plays an important physiological role in assisting digestion. It is further employed in the manufacture of foods and in the d-sizing of textiles. See also AMYLASE, FERMENTATION, BEER.

Diatomaceae (bot.) a large class of unicellular algae occurring in fresh and salt water and on damp soil. The cells are of diverse forms, their walls silicified and formed of two overlapping valves like a box and lid. The cell has a single complex nucleus, brownish yellow chromatophores and often contains much oil.

Diatomaceous Earth, a soft light coloured deposit composed of the siliceous skeletons of diatoms. These are minute lowly organised plants

found in most seas and on their death their skeletons sink to the bottom and form deposits of sediment known as diatomaceous ooze which in time hardens into diatomaceous earth.

Typical diatomaceous earth is very light and porous and absorbs water like a sponge. It is fairly widely distributed and is found especially in the United States where the Virginian deposit is probably the largest known, attaining a thickness of 40 ft. in places. It also occurs in New Jersey, Nevada, California and other States and in Europe is found in Bohemia where every cubic inch contains 14 million diatom skeletons on the average and in the upper cretaceous rocks of the Paris basin as well as in Skye, Aberdeen, Lewis and Mull in this country. The cretaceous deposit is the earliest of note though diatoms have been found in the Upper Lias of Germany. The majority of deposits are Tertiary in age.

As Tripoli Earth, diatomaceous earth is used for polishing purposes and as a tooth powder. It also serves as a non-conducting lining for boilers and refrigerators and has been used in making dynamite. It is often known as kieselguhr.

Diaz, Armando (1861-1918) Italian marshal. Served in the Italo-Turkish War, was appointed Major-General 1914 and Director of Military Operations on Italy's entry into the World War. Succeeded Cadorna as Chief of the General Staff 1917 and defeated the Austrians at Vittorio Veneto Oct.-Nov. 1918. He then became Inspector-General, was treated Duca della Vittoria and Minister of War by the Fascist Government 1922. Resigned and was appointed Marshal 1924.

Diaz da Novaes, Bartholomeu (c. 1440-1500) discoverer of the Cape of Good Hope in 1488. He sailed round the coast of Africa as far as Mossel Bay and sighted over 1000 m. of coastline. He later accompanied the first expedition to Brazil.

Diaz, Porfirio (1830-1915) Mexican statesman, joining Juárez in the

revolt against the dictator, Santa Anna (1854), Diaz had Mexico under his control by 1862, when the French invaded the country to uphold the claims of the Emperor Maximilian



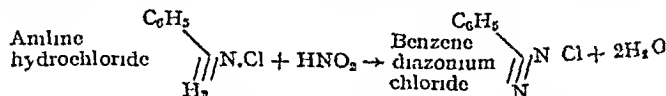
Porfirio Diaz

Diaz was largely responsible for their defeat, and Juarez became President of the Republic Lerdo, who succeeded Juarez in 1871, was overthrown by Diaz in 1876. Diaz now ruled almost continuously till 1911, when revolution drove him

from Mexico. He carried out many financial and political reforms during his 30 years of office.

Diazo Compounds, a group of organic compounds characterised by the presence of the group $-N_2-$. They are prepared by means of the diazo reaction, which consists in treating a primary aromatic amine with nitrous acid. The nitrous acid is always prepared *in situ* by the action of a dilute mineral acid on sodium nitrite. The diazo-reaction should be carried out at a low temperature, not as a rule exceeding 5°C .

A typical instance of diazotisation is the following



Salts of this type are manufactured in large quantities for the production of dyestuffs.

Dickens, Charles (1745-1814), English dramatist, song writer, and musician,

remembered for his sea song, *Tom Bowling*. Besides his many songs he wrote novels, a *History of the Stage*, and about 70 musical dramas.

Dice (*sing die*), cubes, usually of bone or ivory, marked on each side with from 1 to 6 dots, in such a way that the total number of dots on any two opposite sides is always 7. They are used for gambling, and to decide moves of the pieces in such games as *backgammon* (*q v*). Dice, which were probably derived from knuckle bones, are of immense antiquity. They are thrown or rolled from a dice-box or the hand. A form of spinning die, called a *tectotum*, used in many games of chance, also came from the East.

Dicentra (*Bleeding Heart*, *Dutch man's Breeches*), a hardy herbaceous garden plant belonging to the family *Fumariaceae*, first introduced in 1731 from America, Siberia, and Japan. The roots are tuberous or fibrous, the pale-green divided leaves spring from the root and are 8-12 in. high; the clustered flowers are pink or rose-coloured with darker shading.

Dickens, Charles, **John Huffam** (1812-1870), English novelist, was born at Portsea. His first literary efforts were sketches, signed by "Boz," which



Charles Dickens

accompanied Cruikshank's illustrations in *The Old Monthly Magazine* (1833-4). In 1837, he began to describe the adventures of the *Pickwick Club*, intending these merely as a frame for the

humorous drawings of Seymour but they quickly became extremely popular. The first novel that aimed at social reform, *Oliver Twist* followed in 1838. His next novel *Nicholas Nickleby* (1839) combined the humours of the *Pickwick Papers* and the melodrama of *Oliver Twist* and set the style he followed so successfully in many stories. He then designed a series of stories to be published

complicated structure was a failure. For a year Dickens lived in Italy writing *Christmas Books*. On his return he was for 3 weeks editor of the *Daily News*. *Dombey and Son* (1846-8) was followed in 1849 by his masterpiece *David Copperfield* which is in a sense an autobiography and so has less caricature and portrays more genuine life than any other of his books. *Bleak House* (1853) *Hard Times* (1854) *Little Dorrit* (1857) *The Tale of Two Cities* (1859) and *Great Expectations* (1861) followed in quick succession appearing serially in *Household Words* and *All the Year Round* both of which Dickens edited. One more complete novel *Our Mutual Friend* (1864-5) and the unfinished story of *Edwin Drood* make up the tale of his works. He died very suddenly his health had been undermined by the many tasks he imposed upon himself for in addition to his writing and editing he had been engaged in lecturing and giving readings from his works all over the country. See also NOVEL THE ENGLISH.

Dickinson Goldsworthy Lowes (1863-1931) English scholar, author and philosopher was a Fellow of King's College Cambridge and lecturer both there and at the London School of Economics. He was well known as interpreter and upholder of the Greek view of life which is the subject of many of his books. His works include *The Greek View of Life* *A Modern Symposium* *The Music Flute* *The Development of Parliament in the Nineteenth Century* *Religion and Immortality*.

Dicksee, Sir Francis Bernard (1853-1928) English painter. A.R.A. 1881. R.A. 1891. P.R.A. 1904 (when also he was knighted). K.C.V.O. 1917. Dicksee's paintings are romantic in subject and technically competent in execution. His work was completely unaffected by the developments in painting brought about through the French impressionists and their successors of the modern school. His *Harmony* (1877) and *The Two Crowns*



Dickens Birthplace Portico

under the general title of *Master Humphreys' Clock* and told by members of a family party that included Mr Pickwick and the Weller. The first of these was *Barnaby Rudge* (1840) the second *The Old Curiosity Shop* (1841). In this latter the melodrama and humour were not so cleverly welded as formerly. *The Christmas Carol* appeared in 1843.

Following his first visit to America *Martin Chuzzlewit* (1844) appeared. This possibly because of its extremely

(1900) were bought for the nation and hang in the Tate Gallery, London

Dicotyledons, one of the two groups of flowering plants, primarily distinguished from the Monocotyledons by the two cotyledons or seed leaves formed at the end of the growing embryo, and by the depression between which the growing point of the shoot originates. Monocotyledons have a single large terminal cotyledon, and the growing point is lateral. Dicotyledons are further distinguished by the broad single or compound leaf with longer or shorter stalk, the pair of stipules or leaflets at the base of the leaf-stalk, the absence of a leaf sheath (except in Umbelliferae) and the net veining of the leaves. The margin of the leaf is variously developed, and the stems undergo secondary thickening. The flowers are typically composed of five whorls, with five members in each: sepals, petals, stamens (2 whorls), carpels, but there are numerous exceptions to this. The Dicotyledons include the Ranunculaceae, Cruciferae, Papaveraceae, Rosaceae, Caryophyllaceae, Leguminosae, and many other families.

Dictatorship signifies usually personal and absolute rule, outside the provisions of a Constitution. In ancient Rome such rule was often temporarily instituted when some crisis demanded rapid action and military control. The modern growth of dictatorship as a political force, however, is essentially post-War. Now, as of old, dictatorial power in defiance of the constitution is often obtained by the support of the Army.

The immediate post-War months and years were marked in Europe by a tremendous growth of Socialist, and in some quarters of Communist doctrine. Hereditary royal houses were overthrown, ancient landed aristocracy dispossessed, new constitutions drawn up.

The new administrations had usually no previous experience of government, and naturally made initial mistakes. Moreover, the economic dislocation of

the War rendered their task still more difficult. Needs did not come up to their idealist promises, and a reactionary political movement was inevitable which came not by the restoration of previous monarchies, but in the form of individual dictatorships.

The most notable example, which has served as model to most others, is that of Italy. After the Peace of 1919 the Italians, disappointed at not having received Dalmatia, and tired of a weak Liberal Government, turned towards Socialism. Strikes, riots, local Communism, high prices, and food shortage led rapidly to confusion. A Nationalist and Fascist (q.v.) movement, chiefly among ex soldiers, soon gained ground, and in September 1922 Benito Mussolini, an ex-Socialist, organised a Fascist "march on Rome". The King refused to authorise a declaration of martial law, and invited Mussolini, by telephone, to go to Rome as Prime Minister. From that time on Fascism became, not only the ruling political force, but a State philosophy in which all citizens were required to participate. Assuming complete power, Mussolini embarked on a complete reorganisation. Socialism, Liberalism, and all other rivals of his system were forcibly suppressed, industry and agriculture were freed from heavy duties, and with careful encouragement quickly recovered. The Italian dictatorship did not abolish the Constitution, as did most others, but manipulated it to secure unanimity in all the parliamentary bodies, which are only elected by and from recognised Fascists. Its power has remained absolute ever since.

In Russia, after the Communist Revolution of Oct. 1917, the complete collapse of governmental and economic administrations, war on the borders, foreign intervening armies in the interior, and acute famine everywhere demanded strong central action. The Bolshevik (q.v.) party, led by Lenin and Trotsky, began to exercise dictatorial control in the name of the workers by ruthless and absolute methods.

In Hungary the brief and abortive Communist régime of Béla Kun in 1919 was immediately followed by a conservative coup organised by the old feudal landowners who had from time immemorial ruled their own estates absolutely and the country indirectly. There was a short White Terror and Admiral Horthy restored the kingdom though without a king himself retaining absolute power as Regent.

In Turkey the War brought a tremendous rise of Western ideas among the younger generation who revolted against the traditional religious conservatism of the caliphate. In addition a national consciousness threw into shadow the old international unity of Islam. In 1919 Kemal Pasha a successful Army officer was sent to E. Anatolia with wide military powers. He used them to form a select band of modernising reformers and in 1919 declared at Angora a new policy of liberation both from foreign influence and from cramping tradition. The caliphate was abolished and a democratic republic with a single chamber instituted. Kemal Pasha becoming President. In a country used to autocratic government and in the face of stern opposition on the part of the older generation he wielded untrammelled power.

In Spain a growing restlessness at the incompetence which culminated in the disastrous Rif campaign in Morocco led to the complete discrediting of a corrupt Parliament. In the year 1931 General Primo de Rivera offered to form a government in face of the growing chaos but upon acceptance of his offer personally assumed the power. As a result of the rising cost of living and the loss of the backing of the Army the dictatorship lost its grip and in 1931 Primo de Rivera resigned. Two years later revolution followed. King Alfonso left the country and a republic was established.

Poland carved out from the Russo-German frontier lands by the Peace Treaties was the scene of a struggle with the Bolsheviks until 1918. Both

by historic tradition and by fear of its Communist neighbour the new State was driven to a Conservative constitution in which considerable powers went to a Senate composed of the old land-owning nobles by whom Radziewski Poland was governed. By 1918 the Parliament had proved itself inefficient and unable to deal with the difficult problem of the minorities. Marshal Pilsudski a hero of the resistance to Russia being dismissed from the War Office marched on Warsaw appointed a nominal President and assumed the post of Prime Minister allying himself with the old land-owning aristocracy to which he himself belonged.

In post War Yugoslavia power was rapidly centralised in Belgrade the Serbian capital and this was bitterly resented by the new provinces especially Croatia which was not only more Western in outlook but had a long and proud history of its own. Bitterness between the two provinces grew steadily and culminated in the shooting of the Croat leader in Parliament in 1928. Thereafter the Croat deputies refused to attend. Conditions became so critical that King Alexander fearing the break up of the kingdom and weakness in the face of foreign hostility dissolved Parliament in 1929 and instituted a dictatorship. Although nominally super provincial his direct rule increased centralisation favoured the Serbians and relied upon their support.

During 1932 and 1933 in Germany the National Socialist or Nazi Party led by Adolf Hitler rapidly rose to complete control. Hitler becoming Chancellor secured dictatorial powers all other parties were suppressed the Lutheran Church industry banking and practically every form of activity was regimented and subjected to Nazi domination. Jews in large numbers were expelled from their posts as University professors hospital doctors public officials etc. An absolute revolution in the form of government was effected and no

opinions opposed to the Nazi dictatorship were allowed to be expressed in the Press or in any other manner. Adolf Hitler, an Austrian by birth, had served as a corporal in the German Army during the war.

The year 1933 also marked the establishment of a dictatorial régime in Austria under Dollfuss (*q.v.*), largely as a measure of defence against German overtures to the Nazis in the country.

From the observance of these eight examples, several distinguishing characteristics of post-War dictatorship can be discovered. In the first place it is commonly born of the breakdown of a previous Liberal form of government. It involves the forcible suppression of other parties, and the withdrawal of freedom of speech. In most cases the dictator comes to power with the support of a single section of the people—Mussolini with the ex-soldiers, Lenin and Trotsky with the town-workers, Horthy with the feudal landowners, Kemal with the Young Turks, Primo de Rivera and Pilsudski with the Army, Alexander with the Serbs, and Hitler with the backing of a large proportion of the younger generation of Germans. The record of dictatorships, once established, varies greatly, some working wholly for the particular faction which supports them, others for the development of the nation as a whole. All tend to be ruthless in the achievement of their ends, whether partial or disinterested. See also FASCISM.

Dictionary, a book containing words arranged in alphabetical order, with explanations of them, or equivalents, added in the same or another language. It may be of a general character, including all or most of the words (other than proper names) of a language, or it may be confined to a particular class of words (*e.g.* a Biographical Dictionary or a Gazetteer), and it may embrace explanatory articles upon every subject (see ENCYCLOPEDIA but the term is

usually applied only to a general word-book or lexicon. The earliest English dictionaries, beginning in the 16th cent., did not aim at completeness, but gave Latin explanations of the harder English words, or *vice versa*. The first attempt at a complete dictionary was that of Nathan Bailey in 1730. In the 18th cent. the language was thought to have reached its pitch of perfection, and Dr. Johnson was entrusted by a group of booksellers with the task of giving permanent form to it in his Dictionary (1755). Naturally it achieved no such result, and contained much error and faulty scholarship, but it retained a certain value even to this day. The principles of scientific philology were introduced by Archbishop Trenchard in the 19th cent., and these were embodied in Skeats's scholarly *Etymological English Dictionary* (1882). The *Oxford New English Dictionary* (1884–1928) is the last word in exhaustive completeness. Professor Daniel Jones's *English Pronouncing Dictionary* is a good and scientific attempt to indicate the pronunciation of English by educated persons.

Didache [DIDAKHĒ], an early Christian document, purporting to contain teaching of the Twelve Apostles. Consisting of two parts, a collection of ethical maxims and a manual of Christian Church usage, it was written early in the 2nd cent. A. although part was probably written in the 1st cent. It was discovered at Constantinople in 1875.

Didactic Poetry, the name given to that form of verse literature which gives expression to the facts or principles of some art or science, which may truly be called poetry, and which surrounds such facts with imaginative beauties. The earliest example is Hesiod's (*q.v.*) *Works and Days*, which was written in verse because that was the only known literary medium, but the *Didactic* poem of classical literature is Vergil's *Georgics*. Other examples

Horace's *Arts Poetica* and Lucretius' *De Rerum Natura*. Such poems have served as models for modern didactic poets for example those of the 18th cent in England.

Diderot, Denis (1713-1784) French author and encyclopædist. His early works mainly concerned with religion and psychology are not remarkable. He was the moving spirit of *Les Philosophes* who formed a literary club of great importance. In 1751 the first volume of the famous *Encyclopédie* was published and the last in 1772. In 1759 it had been banned by the authorities. The emphasis placed in it on scientific knowledge and religious toleration and its

sympathy with the oppressed classes account for this. Diderot devoted 20 years to this monumental work and wrote most of the articles but he would have died in poverty had it not been for the generosity of Catherine Empress of Russia. His other works include stories, plays, satires and art criticism. It was in his conversation however that his greatness was really apparent.

Dido legendary queen and founder of Carthage also known as Elissa whose story is told in Vergil's *Aeneid*. She stabbed herself on a funeral pyre to avoid the chieftain Iarbas who offered her war or marriage. In Vergil's version of her story she kills herself because Jupiter orders her lover Aeneas to leave her.

Die-casting a method of casting metals by forcing them under pressure into moulds of a strong and permanent character capable of repeated use. Die-casting is said to have originated with the invention of printing which necessitated the production of sharply cast types in large numbers. A very simple device in common use is that in which the metal is exposed to the heat of a gas jet in a cylinder connected to the bottom of a reservoir of molten metal. A plunger in this cylinder which may be operated automatically or by hand forces the metal through a pipe into a die made in two halves which can be opened to allow of the casting being taken out.

The metal commonly used for casting is a white brass with a characteristic composition of 86 per cent zinc, 7-10 per cent tin and 4-7 per cent copper. This allows of a minimum thickness of 0.1 in. Metal of this type has less tensile strength than ordinary yellow brass but very much the same wearing qualities. It may be used for all parts of light machines which are not exposed to heavy stress. Pure aluminium can be die cast but a metal of better quality for most purposes consists of an aluminium bronze containing 9 per cent of aluminium and 8 per cent of copper. This metal is particularly suitable for gears which can be cast with such perfection as to need no machining whatever. The accuracy of die-casting may be as high as 0.0005 in if great care is given to maintaining the die without expenditure in this respect an accuracy of 0.001 in is easily attained. See **ALLOYS**.

BIBLIOGRAPHY Anonymous *Die Casting* (New York and London 1911). **Dielectric**, see **CONDENSER ELECTRICAL**. **Dielectric Constant**, see **ELECTRICITY**. **Dielectric Loss**, see **INSULATOR**. **CONDENSER ELECTRICAL**. **Dielectric Strength**, see **INSULATOR**. **CONDENSER ELECTRICAL**. **Diemen** Anthony van (1593-1645) Dutch admiral. Appointed Governor General of the E. Indian colonies 1636 he extended Dutch influence and trade throughout the Far East, promoted education and sent out exploring



Denis Diderot.

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expeditions to Australia, 1636-42 Abel Tasman, leader of one such expedition, discovered New Zealand in 1642, and named the island now known as Tasmania

Dieppe, French port on the NW coast in department Seine Inférieure, some 50 m NE of Havre Dieppe is a busy port, and a popular watering-place, it is about 65 m from Newhaven, with which it is connected by a regular cross-channel steamer service Exports include wine, silk, woollens, fruit, and vegetables, and the main industries are shipping engineering, lace, and spinning There is considerable fishing, the town supplying much of the Paris market The castle dates from the 15th cent, and the Church of S Jacques from the 13th Pop 24,950

Dies Iræ ("Day of Wrath"), the opening words of a hymn which in Catholic usage forms part of the Mass for the Dead It was written in the 13th cent by Thomas of Celano, a Franciscan

Diet, the session of a council or assembly, and hence the body itself The word is now used principally of the Polish legislative assembly, it was formerly applied to the council of princes and senators of the Holy Roman Empire

Dietetics, the study of food in relation to the promotion and maintenance of health In order that the essentials of well-balanced meals (mixed proteins, carbohydrates, fats, roughage, vitamins, mineral salts, liquid) should be ensured in the daily meals, the following food should be included

(1) Varied proteins, cheese, eggs or some similar dish for lunch or dinner.

(2) Fresh fruit once or twice daily

(3) Stewed or baked fruit, with a milk dish once daily

(4) Uncooked greens, i.e. salad or watercress, or fresh lemonade or orangeade

(5) Foods containing calcium (see MINERAL SALTS), cheese contains the highest percentage

(6) Foods containing iron (see

MINERAL SALTS), of especial importance if any members of the family are anæmic

(7) Vegetable soup occasionally

(8) At least 3 or 4 pints of liquid daily Some of this is absorbed into the large intestine, which lessens the possibility of constipation The average person should drink before meals, but those with insufficient gastric juices, or heart trouble, are advised to drink between meals

(9) Too many fried foods or fatty dishes (such as pastry), should be avoided

It is important to include the correct foods in approximately the correct quantities The quantity will vary according to the weight, height, sex, and activity of the individual As a guide, suggestions for a day's food, giving quantities for an average woman or girl over 14 years of age, who takes moderate exercise, are given below

Breakfast

- 1 orange
- 1 oz shredded wheat
- 1 oz bacon
- 1 oz fried bread.
- 1½ gills milk
- 1 oz sugar
- 2 oz bread
- ½ oz butter
- 1 oz treacle
- 2 cups of tea

Lunch

- Grilled tomatoes (4 oz) on toast (1 oz
- ½ oz bread
- ½ oz butter
- 1 oz cheese
- Banana junket
- (4 oz. banana, 1 gill milk, ½ oz sugar
- ½ pint lemonade

Tea

- 2 oz bread
- ½ oz butter.
- 1 oz. watercress
- 1 gill milk } in tea
- sugar

Dinner

3 oz liver
 ½ oz fat for frying
 3 oz fried sliced onion.
 ½ pint water
 6 oz potatoes
 10 oz turnip tops
 4½ oz dried fruit salad
 ½ oz brown sugar
 Blancmange made with ½ pint milk
 Dietrich, Marlene (b 1902) German
 film actress was trained as a pianist
 but owing to an injured wrist took up
 acting. She came at once to the fore



Marlene Dietrich.

with her performance in *The Blue Angel*. Other films in which she has appeared are *They Love Dishonor*, *Shanghai Express*, *Blonde Venus* and *The Son of Sin*.

Diffraction, *s s* Optics

Diffusion (ch m) the phenomenon that occurs when two different but miscible fluids are placed in contact with one another the substances slowly pass one into the other until when sufficient time has elapsed (it may be seconds or days according to the nature of the fluid and other circumstances such as the temperatures and

the areas in contact) the composition of the fluids is homogeneous i.e. perfect mixing has occurred. Diffusion may also occur between solids and solids or between solids and fluids.

The diffusion of gases is the phenomenon that has been most studied in connection with diffusion. The foundations of the work were laid by the researches of Graham a British chemist of the middle 19th century. Graham's law of diffusion states that the velocity of diffusion is inversely proportional to the square root of the density. Thus of the gases oxygen and hydrogen the former having a density 16 times as great as the latter diffuses at a quarter of the latter's speed.

Diffusionism, the theory that human culture was spread by degrees by outward expansion from a single source as opposed to the view that cultures are developed independently and are only diffused when a particular people develops a more or less permanent type of culture which is well in advance of that of neighbouring peoples and becomes impressed upon the latter. A familiar instance of the latter is the adoption of Western civilisation by Japan. For diffusionism conditions must be favourable for the reception of the new culture and there must be individuals capable of using the fresh ideas; there must also be some attractive elements about the culture. Frequently culture traits decline instead of developing into more specialised types. See also ETHNOLOGY.

CULTURE DIFFUSION OF

Diffusion Pump, *see* AIR PUMP

Digamma (pron DIGA MA) an ancient Greek letter already obsolete in classical times so called because its form resembled a double gamma (Greek *g*) thus—*ϝ*. It was pronounced like an English *w*.

Digby Sir Kenelm (1603-1665) English naval commander, author and diplomat was concerned in intrigues on behalf of the English Catholics. He was afterwards employed by Cromwell to mediate with France and

Spain A man of diverse interests, he helped to found the Royal Society

Digester, *see* AUTOCLAVE

Digestive System, the organs of the animal body concerned with the digestion and assimilation of food, and consisting of the alimentary canal and its associated glands

In the typical *vertebrated animal*, the mouth has teeth and a movable tongue It is followed by the pharynx, œsophagus, stomach, which is an expansion of the œsophagus, and intestine These may be modified by saccular or tubular outgrowths, and with them are associated digestive glands, of which the most important is the liver, opening with a second gland, the pancreas, near the junction of the intestine with the stomach Generally there are salivary glands opening into the mouth

In the lamprey and hag fish, which have no jaws, the mouth is armed with horny teeth, and is converted into a sucker by the piston-like action of the tongue

In the typical *Fishes*, the tongue is hardly movable and the teeth vary greatly in size, shape, and position They are usually sharp and piercing, but may be in the form of broad crushing plates There are no salivary glands, and the œsophagus is usually short and the stomach large, and at the entrance to the intestine there is frequently a cluster of fine projecting tubes, as in the herring, cod, and others. The intestine is usually coiled, and the mucous membrane of its inner surface is raised into ridges, and in several species, *e.g.* sharks and lung fishes, its absorbent surface is increased by a spirally-coiled longitudinal ridge, known as the spiral valve The anus is usually posterior, but in some of the bony fishes it may open far forwards The liver is always, and the pancreas usually, present In the *Amphibia* the tongue is usually present In newts and salamanders it is immovable, but in frogs and toads it is at the front of the jaw and is shot out for the capture of food In the Surinam toad and

the S African clawed frog, it is absent Small fine teeth are generally present but most toads are toothless The œsophagus, stomach, and intestine are simple The liver and pancreas are present, but there are no salivary glands

All *Reptiles* have a tongue, which varies in shape, length, and the extent to which it can be protruded Tortoises and turtles have no teeth in the other orders they are present but are typically used for holding prey not for mastication Exceptionally, in the venomous snakes, they are used for killing The rest of the alimentary canal shows no special features

No existing *Birds* (*qu*) have teeth the jaws being encased in horny sheath constituting the beak, which varies greatly according to the nature of the food The tongue is always present and more or less horny, its shape and function varying, like the beak, with the nature of the food The rest of the alimentary canal is more uniform in structure Salivary glands open into the mouth The œsophagus is often expanded into a crop for the storage of food, and at its lower end it is enlarged and glandular, forming the proventriculus, the true stomach being represented by the muscular gizzard which is smaller in birds of prey larger in grain-eaters for grinding harder food, a process which is aided by stones swallowed by the bird, the intestine is coiled, and in the first loop below the gizzard lies the long pancreas

In *Mammalia* the mouth, except in the duckbill, is provided with movable lips Teeth very varied in form and function are present, except in some ant-eaters and the whalebone whales The tongue also is modified in a variety of ways according to diet The cheeks are sometimes enlarged to form pouches for the storage of food, as in some monkeys and rodents, the duckbill, and a few others, and salivary glands are almost always present The œsophagus and stomach are usually simple, but the stomach may be subdivided into chambers, which are

specially well developed in the porpoise and in cud-chewing species. The intestine is divided into two main parts, the small in front and the large behind, separated by a valve, this point of junction being marked in most species by a tubular dilatation, the caecum, which is relatively enormous in some species, such as the rabbit and sheep, but is absent in the dormouse. It is fairly large in monkeys and of the same calibre throughout, but in anthropoid apes and men its outer end is reduced to a narrow tube, the vermiform appendix, which is not only functionless, but a pathological danger.

In man the alimentary canal is some 28 ft. in length, and the process of digestion is as follows. The food, broken up by the teeth, is mixed with saliva, which contains a substance known as ptyalin. This has the power of acting upon starch particles, found in potatoes, bread, etc., and changing

it into a more soluble form. The muscle coat, by its rhythmic contractions, enables the food to be thoroughly mixed with the pepsin. Together, these enzymes have the power of breaking up the protein molecules (found in meat, etc.) into smaller, soluble molecules called peptones. The hydrochloric acid tends to kill any live bacteria that are present in the food.

The food then enters the next part of the canal, a long tube occupying a considerable part of the abdomen. The muscles of the small intestine propel the food downwards by rhythmic contraction, called peristalsis; one segment of muscle dilates, while the preceding one contracts, and so squeezes the food along. The small intestine also has two ducts entering it—the pancreatic duct, conveying juice from the pancreas, and the bile duct, which empties bile from the liver and gall bladder into the interior of the canal.

The stimulus which causes the pancreas to secrete is a hormone, called

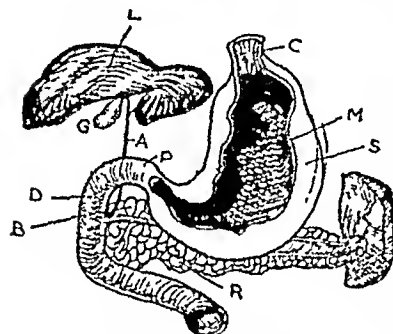
per day. This juice acts upon the fats contained in the food, which till now have remained unaltered, splitting them up into glycerol and fatty acids. Bile also has some action upon the peptone of gastric digestion, making it more concentrated and solid, retarding its progress through the small intestine, thus allowing the pancreatic juice more time to act upon it.

The absorption of substances is almost entirely carried out in the smaller intestine by means of minute projections of the wall, called villi, which allow

sugars pass directly into the blood stream via the network of small blood-vessels. These vessels anastomose to form veins, which in turn pour their contents into one main vein—the portal vein, which conveys this blood to the liver, where certain changes take place in the absorbed material, some being modified for storage and some passed on for immediate use (see LIVER and CIRCULATORY SYSTEM). Another substance which is absorbed in the small intestine and reaches the liver is unused bile. This is ultimately stored again in the gall-bladder.

The unabsorbed material is all that reaches the next part of the alimentary canal—the large intestine, a tube, some 30 in long and somewhat wider than the small intestine, possessing the familiar muscle and mucous coats, but without villi. The food residue on leaving the small intestine is in the form of a jelly. The large intestine extracts from this jelly whatever water is required by the body, thus making it more concentrated. No other absorption can take place here with the exception of the sugar glucose, which is of practical importance, as we shall see later. The bowel can also throw out or excrete salts such as calcium, magnesium, and iron, chiefly in the form of phosphates if these be in excess of the body's needs. The glands of the large intestine secrete mucus, a lubricant resembling that of the oesophagus, which facilitates the easy passage of the now firmly formed residue. Thus the remaining faecal matter passes into the rectum, and is ultimately expelled from the body (see BOWELS).

Common salt aids the digestion of vegetables and starchy foods. Certain combinations of food and drink are of interest, e.g. the consumption of tea with meat renders the meat indigestible. Another condition inhibiting absorption is when olive-oil is taken in a meal at which alcohol is drunk. The oil prevents the absorption of the alcohol. Soda-water, on the other hand, stimulates the stomach to absorb alcohol



The Human Stomach

- | | |
|-------------------|-------------------|
| s Stomach | M Mucous membrane |
| c Cardiac orifice | P Pylorus |
| L Liver | C Gall bladder |
| x Spleen | D Duodenum |
| n Pancreas | A Bile duct |
| B Pancreatic duct | |

absorbable fluids to pass through them and reach the lacteal or the network of blood-vessels. The fatty acids enter the lacteal, where they are carried via small ducts into a main channel or lymph duct—and thence join the lymph from the rest of the body and flow into the thoracic duct. This duct which lies at the back of the abdomen against the vertebral column conveys these acids in the lymph to one of the main veins entering the heart. There they mix with the blood, and are pumped round the body via the circulatory system to supply the tissues with fuel (see LYMPHATIC SYSTEM). The amino-acids and the

A pathological condition frequently met with in the digestive system is gastric ulcer the formation of an ulcer in the stomach wall. It is brought about by irregular habits as regards food long intervals between meals with perhaps an excessively large meal at the end of the period. All this calls for an abnormal reaction on the part of the stomach and the alimentary system as a whole. Too much hydrochloric acid is produced (hyperchlorhydria) and the erosion of the stomach wall to form an ulcer eventually occurs.

Digitalin *see* FOXGLOVE FAMILY

Digitalis a drug made from the dried and powdered leaves of *digitalis purpurea* the purple foxglove. The active principles are several glucosides of which digitoxin is the principal. Unlike most medicinal plants digitalis contains no alkaloids. It is used to a considerable extent as a means of slowing and strengthening the heart's action.

Dijon, fortified French town capital of department Côte d'Or 196 m S.E. of Paris an important railway centre and noted for its wines from the Burgundy district. The cathedral is 13th cent. The town was bombarded and occupied by the Prussians 1870-1. Manufactures include machinery motor-cars distilling and leather goods. Pop. 83,800.

Dike *see* DYKE

Dilatometer apparatus used to measure changes in volume of solids. The solid is placed in a glass bulb with a capillary tube and the bulb and part of the tube are filled with a liquid which is without action on the solid. If the coefficient of expansion of the glass and the liquid, the volume per unit length of the capillary tube and the volumes of the liquid and solid are known it is possible to determine the coefficient of expansion by heat of the solid by observing the position of the liquid in the capillary tube at two different temperatures. The instrument is however frequently used for observing changes of volume taking

place in solids kept at a uniform temperature. It is then usual to employ a second dilatometer as similar as possible to the first but containing no solid and to observe the relative reading of the two. The apparatus is of importance for determining *transition points* (*q.v.*) as for example in the study of alloys.

Dilke Sir Charles Wentworth (1843-1911) British politician and writer. M.P. 1868-86 and again 1891-1911. A recognised authority on world affairs. Dilke was also an advocate of social and army reform. He expressed his views on modern imperialism in *Greater Britain*, *Imperial Defence* and *Problems of a Greater Britain* (1890).

Dill, *see* SPICES AND CONDIMENTS

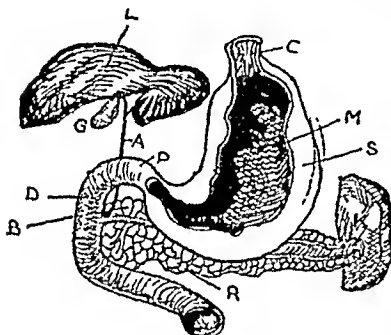
Dillon John (1851-1917) Irish politician a prime mover in the Land League 1886. He was imprisoned in 1889 and the following year toured Australia and New Zealand raising funds for the Nationalist Party. Again imprisoned in 1891 he broke with Parnell on his release. Was leader of a section of the Nationalists for some years after Parnell's death until John Redmond reunited the Nationalists. He attended the Buckingham Palace Conference with Redmond 1914 and when the latter died became party leader. Retired when his party was overwhelmed by Sinn Féin in the 1918 elections.

Dime a tenth part originally a tithe or tribute now exclusively used of a small silver coin in the U.S.A. a tenth part of a dollar or 10 cents (*ad. at par*).

Diminishing Returns, Law of, in economics, the conception that above a certain optimum point the addition of further goods or the application of further labour produces a decreasing amount of result or of output per unit. The theory was elaborated by John Stuart Mill and especially applied to land where continual applications of labour and capital manifestly produce diminishing profit. A further illustration may be drawn from monetary income above a cer-

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acting as an additional prop Like *Iguanodon* in its bipedal gait was another British species *Megalosaurus* standing c 15 ft high when upright. This reptile however was carnivorous and armed with large cutting teeth with a saw like edge A related N American species *Tyrannosaurus* was however larger reaching c 19 ft

Diocesan Conference meeting authorised by the Enabling Act 1919 in which diocesan clergy and representatives of the laity in the Church of England discuss the business of the Diocese (q v)

Diocese ecclesiastical territory under the jurisdiction of a bishop originally the territory under the jurisdiction of a metropolitan

Diocletian, Gaius Aurelius (A D 245-313) Roman emperor 84-303 Succeeded Numerian and Carinus and in 286 proclaimed Maximian Emperor of the West he himself administering Asia and Egypt. He appointed Galerius to control Thrace and Illyria and Constantius Chlorus to rule Gaul and Spain (q v) Under the new arrangement a centralised government was established taxation systematised and the administration reformed Diocletian severely persecuted the Christians in 303 regarding them as a menace to his rule He abdicated in favour of Galerius 305

Diodorus Siculus, Greek historian of the 1st cent B C. His *Bibliotheca historica* deals with Greek history from its mythical beginnings down to the Gallic War Only fifteen complete books have survived

Diogenes (c 412-333 B C) Greek cynic philosopher born at Sinope He resided in a tub before the temple of Cybele upon seeing a shepherd drink from his hand he destroyed his only possession a wooden bowl that he had previously used for a drinking vessel He was captured by pirates and sold as a slave in Crete where on being asked his trade he replied he had none save the ability to govern men and that therefore he had better be sold to a man who required a master Venusades, a Corinthian purchased him

and as a tutor to his master's two sons he spent the rest of his life in Corinth preaching the doctrine of self-control Alexander the Great is said to have been rebuffed by him He asked the philosopher what service he could do him and Diogenes replied Get out of my light

Diogenes Laertius (fl c A D 330) author of lives of the Greek philosophers from Anaximander to Epicurus Nothing is known of his life

Diomedes (δῖος Διόμηδης) mythical Greek hero son of Tydeus performed prodigies of valour in the siege of Troy but he accidentally wounded Venus who had entered the battle to defend Aeneas For this he was punished he lost his way on his return home his wife was unfaithful to him and he was forced to emigrate to Italy where he founded Magna Græcia When he died his companions were changed into swans (the birds of Diomedes)

Dion Cassius (c A D 15-230) Roman historian and administrator Was made *praetor* by the Emperors Pertinax and Severus 193-4 consul 200 and 9 and then retired to his birthplace Nicæa There he wrote his *Romanæ* a valuable history of Rome from the earliest times to the first century of the empire

Dionysius (c 430-367 B C) tyrant of Syracuse He gained control of the city during the war with Carthage 405 B C and extended his power by defeating the Carthaginians 397 His successful campaign against Rhegium and other Greek cities in Italy 391-386 B C further extended his power but he was defeated by the Carthaginians soon after Dionysius raised Syracuse to the position of a leading city and was a patron of literature

Dionysius the Areopagite, mentioned in the Acts of the Apostles as a convert of St. Paul and supposedly the first Bishop of Athens He was also reputed to be the author of works on theology greatly influenced by Greek philosophy These books in their turn

tain income the gaining of, say, a pound becomes of less importance in proportion with the amount of labour expended in doing it

Dimity, a strong cotton material with raised patterns, usually white, used for curtains, especially bed-curtains in the 18th-19th centuries

Dimorphism, a special case of polymorphism (*qv*); the state when the same substance can appear in two different crystalline forms. An interesting example is afforded by ice, which can exist in the ordinary form (light ice) and also, at low temperatures (-20°C) and high pressures (over 2000 atmospheres), as dense ice, which is heavier than water

Dinan, French town in department Côtes-du-Nord, 16 m S of St Malo. It has interesting mediæval fortifications, and its general picturesqueness makes it a popular holiday resort. There are a 14th-cent castle and a Gothic church. Pop 10,000

Dinant, Belgian town in province of Namur, on the R Meuse. Dinant was sacked by Charles the Bold in 1466, captured by Louis XIV in 1675, fortified by the Dutch in 1818, and was captured by the Germans in Aug 1914. It is a popular holiday resort, but its industries, which once supported a population of over 60,000, have now declined. Pop 7000

Dinaric Alps, *see* ALPS

Dindigul, town of Madras, British India, in the Madura district, some 20 m S of Trichinopoly, important for its manufacture of cigars ("Flor de Dindigul"), and general tobacco trade, it also has silk and blanket manufactures, and produces hides and cardamoms. Pop 28,000

Dingaan, King of the Zulus. Granted the Boers, led by Pieter Retief, permission to enter Natal, but later massacred the whole community, 1838. A Boer force, led by Pretorius, overwhelmed Dingaan's army shortly afterwards. Dingaan was slain while escaping into Swaziland, and the Boers made his brother, Panda, King of the Zulus in 1840. The day of Dingaan's

defeat, Dec 16th, is kept in S Africa as a public holiday

Dinghy, a small Indian river-boat, also the small row-boat attached to a larger vessel for general purposes

Dingo, the wild dog of Australia. It is as large as a small wolf, and is probably the descendant of a domesticated breed introduced from Asia by early man

Dingwall, county town of Ross and Cromarty, Scotland, agricultural centre with a large market. Dingwall is of Norse origin, and near by are the remains of the castle of the Earls of Ross. Pop 2000

Dinka, a branch of the Nilotes, a race of mixed negro and Hamitic blood, inhabiting the Anglo-Egyptian Sudan. They are exceptionally tall—often reaching 7 ft—athletic, and possessed of great pride of race. Although chiefly pastoral in their civilisation, they work a certain amount of iron. They are organised in clans, and social cohesion is ensured by their belief in the divinity of their chiefs. *See also* NILOTES

Dinosaur, the name for a large number of mostly gigantic land reptiles of the Mesozoic epoch. Some of them were quadrupedal in gait and some bipedal, like birds, and they included both carnivorous and vegetable-eating forms, the former probably preying upon the latter. One of the largest was *Diplodocus*, which walked on all fours, and was 15 or 16 ft high and 80 ft long, but of this length some 60 ft were taken up by the tail and neck. The neck was relatively longer than in a swan, and the head was quite small. The teeth were insignificant and suitable apparently only for eating soft vegetable food. Another small-headed quadrupedal Dinosaur was *Stegosaurus*, which had a short neck, but carried on its back a series of immense bony plates running from the neck to the tail. Of the bipedal, bird-like Dinosaurs the best known is *Iguanodon*, first found in the Weald. It was a vegetable-eater c 30 ft long and walked about on its hind legs, the tail

ate may be the fauces in front of the throat or the larynx at the upper end of the wind pipe. Very occasionally the bacillus gains access to a wound and gives rise to a complication known as wound diphtheria. In any of these situations it multiplies and by so doing produces a membrane which in the case of the laryngeal type may produce death by mechanical blockage of the air passage. This event however may be treated by an operation known as Tracheotomy:—making an opening into the wind pipe below the membrane and inserting a short tube through the hole so that air can move freely in and out and enable the patient to breathe. The chief danger of the disease however lies not so much in this mechanical factor as in the fact that the bacteria in the membrane manufacture powerful poisons known as toxins which are discharged from their bodies into the blood-stream of the patient. These toxins exert their effects throughout the patient's body and particularly affect the muscles which become paralysed so that even if the patient does recover from the disease he may suffer from after-effects in the form of palsies for a considerable length of time. Very insidious moreover is the action on the muscle of the heart. Great care in nursing is required to prevent any sudden exertion by the patient for the heart is often unable to meet the extra demands made upon it by sudden exercise. Even the exertion of sitting up may prove fatal.

The way in which the body resists the disease is by production of certain substances which counteract the toxins and destroy the bacilli. These are known as anti toxins but their constitution is not as yet understood. If diphtheria bacilli are grown in a tube outside the body in a suitable nutritive material they will multiply and produce their toxin. This toxin can be filtered from the bodies of the bacteria by suitable laboratory technique and it has been found that if this toxin is

repeatedly injected into an animal such as the horse in gradually increasing doses the horse's body produces anti toxin in very large amounts. This fact has been utilised for the preparation of anti toxin for administration to human beings who are suffering from the disease by withdrawing small quantities of the horse's blood and filtering off the blood-cells leaving a clear serum which can be injected into the patient. This anti toxic serum is the only known method of combating the disease when it has once developed. Without it the disease would have to be allowed to run its fatal course with it it is often brought to a speedy and uncomplicated end.

Diphthong a sound made up of two vowel sounds and which is distinct from either of the two original. The four English diphthongs are: formed of *a* and *i* as in the word *sie* or formed of *au* and *i* as in join *ow* composed of *a* and *u* as in mouth and *u* composed of *i* and *u* as in *rebut*. Many double vowels are not true diphthongs.

Diplodocus a huge extinct Dinosaurian Reptile (see DINOSAUR) with an exceedingly long neck and tail. It



Skeleton of Diplodocus.

stood c 13 ft high and reached over 60 ft in length. It seems to have been a vegetable feeder and was possibly partially aquatic in habits.

Diplomacy the art of conducting official intercourse between different countries. This power of international negotiation is in England delegated by the King to diplomatic agents presided over by the Secretary of State for Foreign Affairs. Each country with absolute sovereign power has its diplomatic corps. The practice of diplomacy is governed by a uniform system and fixed rules first laid down

influenced the mediæval scholastics, e.g. Thomas Aquinas.

Dionysius of Halicarnassus, Greek historian and critic of the reign of Augustus, remembered for his *Roman Antiquities*, a history of Rome from its mythical beginnings down to the first Punic War. His critical works deal with literature and rhetoric.

Dionysus [δῖονιςϑς], Greek god of the vine (Roman Bacchus), was also called Dithyrambus. He travelled through the ancient world, accompanied by the Maenades (qv.) or Bacchantes. The festivals in his honour were signalled by orgies (Dionysia and Bacchanalia), and, in Athens, by the performance of dramas. These were originally songs sung by a chorus, and slowly developed into classical Greek drama with the introduction of characters and dialogue. In Rome, the Bacchanalia (qv.) were celebrated with such drunkenness and debauchery that they were banned by the Senate.

Diorites, a group of rocks composed essentially of a soda-lime felspar and hornblende. A somewhat unnatural group, embracing a wide range of types from acid to basic, grading in the basic direction into gabbros (qv.). Diorites were formed by cooling far below the surface, and occur in the Scottish Highlands, Wicklow, the Channel Islands, the Tyrol, California, and elsewhere. According to the chief mineral present, the different varieties are termed quartz-diorite, mica-diorite, hornblende-diorite, augite-diorite, etc. Formerly Diorites were included in the term "Greenstones".

Dioscoreaceæ, a family of twining shrubs or herbs belonging to the Monocotyledonous group, but resembling the Dicotyledons in many superficial characters, the leaves being decidedly stalked and having netted veins. The order is a small one, and with the exception of one genus (*Tamus*, the Black Bryony) confined to the tropics. *Dioscorea*, the plant from which the Order takes its name, has large tuberous roots which, as

yams, form as important an article of food in tropical countries as does the potato in temperate climates.

Dip: (1) In geology, the angle which sloping beds make with the horizontal. (2) In magnetism, the angle between the direction of the earth's magnetic field and the horizontal, determined by holding a magnetic needle so that the vertical plane in which it moves coincides with the magnetic meridian. It increases as either magnetic pole is approached, and over the poles is a maximum of 90°, the needle pointing vertically downwards. The dip varies, and in London has decreased from 74° to 67° in the last 200 years. An ordinary compass needle, being suspended in a horizontal plane, never exhibits dip.

Diphenyl, or *phenyl benzene*, $C_6H_5.C_6H_5$, a colourless crystalline organic compound having a melting-point of 70°C and boiling at 254°C.

It can be made by passing benzene through a red-hot tube, when condensation takes place with the formation of diphenyl. Diphenyl also occurs in coal-tar, it is used in organic syntheses, and experiments have been made with a view to its employment in industry as a substance for use in boilers in place of water.

Diphtheria, a disease produced by the entry into the body of the micro-organism known as the Klebs-Loeffler bacillus. The spreading of the disease from person to person is usually confined to cases in which there is direct contact between a healthy and a sick person—i.e. when the healthy person either comes into the range of the sick person's breath or else comes into contact with fluids which have touched his body. Very occasionally milk may become a vehicle for the carriage of the bacillus, and books and the like may also serve as a mode of spreading the disease.

A peculiarity which distinguishes the diphtheria bacillus from most other bacteria is that, after infection, it does not spread in the body, but remains at the site of its primary invasion. This

Direct Current, *see* **ELECTRIC MOTORS**

Directors the agents who act for and administer the affairs of a public company. They are appointed in the first place by the articles of association and added to or replaced by election at the annual general meeting. The powers of a director were indicated and limited by the Directors Liability Act 1890 the Larceny Act 1861 the Winding up Act 1890 and the Companies Acts of 1867 1908 and 1909.

The word director is used also for the head of a department of the War Office e.g. Director of Military Operations and Intelligence Director of Supplies and Transport of a branch of the Civil Service e.g. Director of Establishments and of an educational establishment e.g. Director of Oriental Studies.

Directory the name given to the executive committee of the French Revolutionary Republic from 1795 to 1799. There were 5 members chosen by a Council of Ancients or Upper House out of a list submitted by the Council of Five Hundred or Lower House. One was to retire every year election being for 5 years. After 5 years the directory was superseded by the Consulate of Napoleon.

Dirigible Balloons, *see* **AIRSHIPS**

Dirt-Track Racing *see* **SPEEDWAY RACING**

Dis, Roman name for the mythical king of the underworld (Gr. Pluto or Hades) and also applied to his kingdom.

Disarmament. The principle of disarmament is the abolition or reduction of weapons of war. It was discussed at The Hague Conferences of 1899 and 1907 and laid down as a practical and immediate proposition in the Peace Treaties of 1919. These provided that the arms of the defeated States were to be reduced to negligible proportions, all heavy artillery tanks aircraft, and poison gas being completely prohibited. This was regarded as a first step made

in order to render possible the initiation of a general limitation of the armaments of all nations. (*Treaty of*

Versailles Part IV). The reduction of national armaments to the lowest level consistent with national safety and the enforcement by common action of international obligations was stated in the League of Nations Covenant to be essential to the maintenance of peace.

A so-called Temporary Mixed Commission composed of military financial economic and political experts studied the question between 1921 and 1924 and concluded that disarmament and security must be evolved together. Meanwhile they drew up agreements concerning the private manufacture of arms and the use of poison gas and suggested a plan for the limitation of continental armies.

A treaty of mutual assistance in case of aggression was formulated in 1923 with a view to attaining security and disarmament simultaneously but this was rejected by some of the great Powers including Great Britain and U.S.A. Variations of this principle have been continuously advocated by France ever since. The treaty was elaborated in the Geneva Protocol of 1924 which further introduced the principle of arbitration in international disputes the party which should refuse arbitration to be regarded as the aggressor. The Protocol was also rejected in many quarters and in the Locarno Treaties of 1925 which were mainly confined to Germany and her neighbours recourse was had to the medium of regional sections of war.

The failure of the Coolidge Naval Conference of 1927 at Geneva brought about another gesture in the Pact of Paris or Kellogg Pact 1928 originated by Mr. Kellogg and M. Briand in which 15 States renounced war as an instrument of national policy and accepted the principle of pacific settlement of disputes. By 1930 61 States had signed the Pact. Neither the Locarno Treaties nor the Kellogg Pact however make any direct mention of disarmament. Meanwhile the League of Nations returned to direct consideration of the problem and in 1933

at the Congresses of Vienna (1815) and Aix-la-Chapelle (1818).

Diplomatic Service, a service instituted to facilitate international exchanges of views. The first diplomatic service arose in France in the 18th cent., followed in 1816 by the formation of the British diplomatic service. At first constituted, this consisted merely of one or two Attachés in the service of particular ambassadors chosen by the Prince Regent. Soon afterwards the service became open to competition but candidates were not allowed to take the examination unless they had an income of £400 a year and were nominated by the Foreign Secretary. The 1914 report of the Civil Service Commission led to the amalgamation as far as most ranks were concerned, of the Diplomatic Service and the Foreign Office, and the abolition of the £100 a year qualification, while a selection board was appointed to recommend candidates to the Foreign Secretary.

As at present constituted, the service relegates to the Consuls the task of supervising the welfare of individual British residents abroad, while the international affairs are the province of the Ambassadors or the *Chargés d'affaires*, who are deputies, or officials left in charge for a time. The Ambassadors are appointed by the King, and are given letters of authority signed by the Sovereign himself. The attendants of the Ambassadors are Attachés, and intermediate in rank between the Ambassador and Attaché are the counsellors and first, second, and third secretaries. The Ambassadors and their suite are, according to international law, personally inviolable and exempt from taxation, but may be expelled for misusing the hospitality of the country in which they reside, a fate which befell Captain Boy-Ed and Captain von Papen, German Attachés in America during the World War.

Dipper, or *Water Ouzel*, a bird the size of a small thrush, with a brown back and white breast. It frequents running streams in hilly country, and

fearlessly enters the water in pursuit of the insects on which it feeds. Its nest of moss and grass, with an entrance hole, is made under bridges or on banks and the eggs are laid in late winter.

Dipsacaceæ (*bot.*), the tassel and scabious family. Herbaceous dicotyledonous plants of temperate regions, with flowers crowded together in heads like the Compositæ, but differing in the rigid bracteoles which surround each. The leaves are usually opposite and without stipules.

Dipsomania, a condition of mind and body produced by taking too much alcohol over long periods of time. The dipsomaniac may be perfectly aware of the harm he is doing, but is continually overpowered by the craving for alcohol though he may struggle hard against it. The periods of irresistible desire for drink may be frequent or at long intervals, but generally tend to occur more often until the person becomes a constant drinker. The only remedy is to give up alcohol entirely. Internal organs, such as the liver and stomach, may have become damaged, and even a very moderate indulgence in alcohol is then harmful. Drugs which are sold as drink-cures to help the patient through the inevitable depression while trying to break the habit are to be avoided. Bromides are, however, useful sedatives at such a time. The patient should retire to a quiet place under strict supervision, even to a retreat for inebriates, if need be, and remain there until he has not only lost the desire for drink, but has recovered his health. An attempt should be made to interest him in some hobby or in outside affairs in general.

Diptera, see *FLIES*

Direct Action The attempt to gain political or industrial ends by active means, such as strikes or rebellions, as opposed to argument and negotiation. The phrase is chiefly applied to labour and suffrage movements, and was first commonly applied to the law-breaking activities of the Suffragettes c 1910.

Direct Current, see ELECTRIC MOTORS

Directors the agents who act for and administer the affairs of a public company. They are appointed in the first place by the articles of association and added to or replaced by election at the annual general meeting. The powers of a director were indicated and limited by the Directors' Liability Act 1890 the Larceny Act 1861 the Winding up Act 1890 and the Companies Acts of 1867 1908 and 1929.

The word director is used also for the head of a department of the War Office e.g. Director of Military Operations and Intelligence Director of Supplies and Transport of a branch of the Civil Service e.g. Director of Establishments and of an educational establishment e.g. Director of Oriental Studies.

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appointed a Preparatory Commission for the Disarmament Conference, whose members were Government representatives. A permanent division of opinion soon developed between the French view, supported by Poland, Belgium, Czechoslovakia, Rumania, and Yugoslavia, which demanded security first, and the British view, supported by the United States, Germany, Sweden, etc., which held disarmament to be in itself sufficient guarantee. A draft convention combining both views was drawn up in 1927, and has been the basis of discussion ever since. In 1927 a plan for the total abolition of all armaments and military armies was presented by the Soviet Union, but was rejected.

Meanwhile, outside the League machinery, the Washington Naval Conference of 1921-2 had secured the scrapping of over 1½ million tons of naval vessels, and an agreement not to lay down new ships except for replacement. A ratio of tonnage was fixed between Great Britain, U.S.A., France, Japan, and Italy. Following the Kellogg Pact, a Five-power Naval Conference was held in London in 1930. An agreement, by which Great Britain, the U.S.A., and Japan undertook not to make the replacements of capital ships provided for by the Washington Conference, was the outcome, competition in naval building of all kinds was to be eliminated until 1936. France and Italy reached a compromise regarding their respective naval strengths in Feb 1931.

Simultaneously a draft Disarmament Convention had been finally drawn up by the Preparatory Commission, and was presented at a Disarmament Conference in Feb 1932, attended by delegations from 60 Governments. The French proposed an international League of Nations force to provide security, the British took the Draft Convention as a basis, and demanded disarmament in "offensive" weapons, the Americans suggested a scaling-down of naval figures from those of the Washington Con-

ference and the abolition of heavy land weapons, the Italians demanded the abolition of all capital ships, submarines, heavy artillery, tanks, and bombing aircraft. In May President Hoover proposed a one-third reduction in all armies and battleships. In Sept Germany withdrew from the Conference pending recognition of her equality, which was admitted by a Five-Power agreement in December.

The General Commission of the Disarmament Conference continued to meet during 1933, when the British proposals were discussed. These were accepted by France in May, with the reservations that international control of armaments be established, and that disarmament be reached by gradual stages. In the same month a Four Power Pact was concluded between Great Britain, France, Germany, and Italy in Rome, guaranteeing peace in Europe for 10 years, with the option of 10 years' renewal.

In October 1933 there seemed to be no prospect of agreement in the Disarmament Conference, and at last near the end of the month the German Nazi Government withdrew from the Conference, and announced that Germany would also cease to belong to the League of Nations. Sir John Simon, the British Foreign Secretary, declared that Great Britain, in an effort to set an example, had already reduced her own forces "to the edge of risk".

Three principal reasons are put forward for disarmament. The first is the moral obligation of the Allies, under Article 8 of the Covenant and the Preamble to Part V of the Versailles Treaty, which states that Germany's disarmament would be only a prelude to theirs. The second lies in the belief, supported by the experience of 1900-14, that heavy armaments inevitably lead to war, and that any future war utilising modern bacteriological and other discoveries would mean the destruction of civilisation. The third or economic reason is presented by those who maintain that the world to-day cannot afford

the huge sums spent on armaments (Europe £524 millions in 1909) which might be put to more constructive uses

Disciples of Christ, *see* CAMPBELLITES

Disclaimer (law) a renunciation or a denial e.g. by a trustee who does not accept the trust

Discount, a reduction usually expressed as a percentage from a sum of money payable by one person to another. The amount of discount allowed to shopkeepers is the trade discount on the prices of goods quoted at their retail value

Shares and stocks which are priced below their nominal value are said to be at a discount of so much per cent. *See also* DISCOUNT MARKET

BILLS OF EXCHANGE
Discount Market, the market in the discounting of bills of exchange. The market consists of discount houses which buy and sell bills of exchange, the joint-stock banks which lend money at call and short notice or for 7 days to the discount houses and bill brokers who also borrow from the banks and other financial houses using the funds to buy bills of exchange. *See also* BANKING AND CREDIT

BILLS OF EXCHANGE
Discovery in law disclosure by order of the court of documents, facts etc. in the possession of one party to an action which are essential to enable the other party to prove his case

Discuss throwing *see* ATHLETIC SPORTS

Diseases of Animals Acts relate to contagious diseases and are administered by the Ministry of Agriculture and Fisheries and by various local authorities. They apply to all ruminants (q.v.) such as cattle, sheep and goats and to swine, particular attention being given to rinderpest or cattle plague, foot and mouth disease, sheep scab and pox and swine fever. The Acts may be extended to cover any quadruped and there are many special orders relating to horses, asses and mules with regard to anthrax

glanders and farcy and to dogs in respect of rabies. The Acts demand the removal, isolation and possibly the slaughter of diseased animals, the disinfection of places they have occupied and notification of the importation of foreign livestock. The owner of stock destroyed by official order is usually compensated.

Disestablishment, the severing of the connection between Church and State. The Irish Church in 1869 and the Welsh Church in 1914 (by an Act which came into force in 1920) were disestablished and partially disendowed, mainly as a result of the efforts of the Non-conformist section of the Liberal Party. There is a movement both within and without the Church of England for the disestablishment of that body. Inside the Church, disestablishment is supported by a growing body of clerical opinion, both Anglo-Catholic and Moderate, headed by the Bishop of Durham. This movement has grown since the rejection of the Revised Book of Common Prayer by the House of Commons in 1928. This section of opinion holds that disestablishment should not involve disendowment. Outside the Church, there is a large body of opinion which would like to see the Church both disestablished and disendowed.

Disfranchisement, *see* ELECTIONS

Disinfectants substances externally applied to the body or to non-living material in order to kill any micro-organisms which may be present. Chemical disinfectants may be divided into those which act by their toxic properties and those which are strong oxidising agents; there are also physical agents of disinfection such as heat, cold and radiation. The chief chemical method used for the disinfection of rooms and other enclosed spaces is fumigation, which entails the sealing of the space under treatment and the liberation of a disinfecting gas therein. The substance chiefly used for this purpose is sulphur dioxide (wh

sulphur), and formaldehyde, hydrocyanic acid (*qv*) is also used to a somewhat smaller extent, for though effective, it has the disadvantage of being extremely poisonous; it is therefore principally used against vermin and insects.

Individual articles, such as bedding, instruments, liquids, etc., can be disinfected by the application of heat: the temperature should exceed 100°C and be applied for a few minutes, in the case of highly infected textiles, such as bedding, the temperature used may exceed 200°C , and is obtained by the use of steam under pressure. On the other hand, if it is not desired to subject the article to a high temperature, a considerable reduction in the number of bacteria present may be obtained by the use of a lower temperature (not under 65°C) for a longer period, say about 40 minutes, when applied to liquids, and more particularly to milk (*qv*), this process is known as pasteurisation.

Radiation, especially of wave-lengths shorter than that of visible light (i.e. ultra-violet), is a very effective method of disinfection, and the exposure of infected material to sunlight and air is one of the best methods of destroying bacteria.

Of chemical disinfectants which are applied directly to the object to be sterilised, there are a very large number, many different forms of the same compounds being available, under a variety of proprietary names. The principal chemicals employed are potassium permanganate, hydrogen peroxide, iodine, compounds containing active chlorine, such as bleaching powder, compounds of the phenol group, formaldehyde, corrosive sublimate (mercuric chloride), etc. These substances are almost invariably applied in aqueous solution.

Disinterested Management, a system of control in the sale of alcohol, whereby the incentive of private profit is removed. Disinterested management was first introduced in Sweden in 1855, and has proved successful in all

Scandinavian countries, though Prohibition (in Finland) failed completely.

In Great Britain the principle has been applied haphazard in various forms. Various controlling organisations, such as the People's Refreshment House Association, Ltd, the Public House Trusts, and Trust Houses, Ltd, practise disinterested management, but in most cases they control only country inns and hotels. In 1916 the presence of military camps caused the Government to place the liquor trade in Carlisle and district, Gretna, and Cromarty Firth under an official council. The system proved successful, capital liabilities were repaid in a year, and the sale of alcohol in the Carlisle area of several hundred square miles has continued in the hands of a central advisory council, responsible to the Home Secretary. The profits go to the State.

Dislocation, *see* JOINTS.

Disney, Walt (b. 1901), film cartoonist, creator of Mickey Mouse and the Silly Symphonies. He began sketching at an early age, and it is said that as a boy he earned money drawing advertisements for a hair dresser. He was trained at an art school in Chicago. He accompanied an invalid brother to California, and managed to secure the notice of a film producer. The first Mickey Mouse cartoon reel was shown in 1928, and achieved immediate popularity. The coloured films were evolved in 1932, and were equally successful. Disney now employs a large staff of artists and producers and has acquired a fortune.

Disorderly House, a house where persons meet for unlawful purposes: e.g. a brothel, gaming-house, etc. To keep a disorderly house is a misdemeanour punishable with imprisonment.

Dispensation, term used both in constitutional (*see* BILL OF RIGHTS and PARLIAMENT, HISTORY) and ecclesiastical law, meaning the right of the legislature to suspend laws. In the R.C. Church the right is exercised by the

Pope and under his supervision by bishops and provincial synods in minor matters. Abuses of this procedure prevalent in the Middle Ages led to the provision of safeguards by the decrees of the Council of Trent. In England the Archbishop of Canterbury has the power of dispensation in certain minor matters though not from statutory rules.

Dispersion, see OPTICS

Displacement Tonnage the size of a ship as measured by the actual weight of water which it displaces when afloat the figure being reached by dividing the number of cubic feet in the immersed section by 35 the number of cubic feet in a ton of water.

Disraeli, Benjamin, see BEACONS FIELD BENJAMIN DISRAELI EARL OF

Disraeli, Isaac (1766-1818) English author father of the Earl of Beaconsfield was the author of several essays on literature novels and historical works. His best known work was the *Curiosities of Literature* (1791-1834) which like the *Manners and Genius of the Literary Character* (1793) is interesting for its anecdotes.

Dissection, a process of cutting away and separating parts of a body whereby its formation and the relation ship of its parts can be observed. It is performed in the biological sciences and especially in the study of human anatomy. Dissection began on a large scale with Aristotle's work on animals. Erasistratus dissected animals and was probably the first to investigate human anatomy. Owing to prejudice work must be done mostly on lower animals though by the Anatomy Act of 1832 the bodies of unclaimed dead may be handed over to the medical schools.

Dissenter one who dissents from the teachings of the Church of England. The term dates from the days when uniformity in religious doctrine and practice was demanded by law.

Dissociation (chem.) the opposite process to association (*qv*) and is the phenomenon that occurs when molecules break down into smaller mole-

cules or atoms. Dissociation is usually caused by heat (thermal dissociation). Typical examples are the dissociation of phosphorus pentachloride into phosphorus trichloride and chlorine $\text{PCl}_5 \rightarrow \text{PCl}_3 + \text{Cl}_2$ and of ammonium chloride into ammonia and hydrochloric acid $\text{NH}_4\text{Cl} \rightarrow \text{NH}_3 + \text{HCl}$.

The dissociation of electrolytes in solution with the formation of ions is entirely another type of dissociation. *See also ELECTRO-CHEMISTRY and KINETIC THEORY OF MATTER.*

Dissolution, see PARLIAMENT

Dissolution of the Monasteries was carried out in England—of the lesser by an Act passed in 1536 and of the rest by a second Act passed in 1539. Restoration was provided for in 1554 but they were again suppressed in 1559 when all monastic possessions were vested in the Crown. *See also REFORMATION.*

Distemper, see CANINE DISTEMPER.

Distillation, the vaporisation of a substance followed by its condensation. The process is employed in chemical technology as a means of purification and different types of distillation are used for various purposes. The simplest form is the purification of a liquid from dissolved solids: the apparatus consisting merely of a receptacle (the still) in which the liquid is heated, a condenser, a tube surrounded by a water jacket through which the vapours pass and a receiver in which condensed vapours are collected. On heating the still liquid vapours pass as vapour down the condenser where it regains liquid form and is collected and purified in the receiver. Such stills are employed on ships to obtain drinking water from sea water. In the case of many substances however heating to boiling point will cause decomposition and in such cases distillation can be accomplished only by heating in a vacuum: the diminution of pressure lowers the boiling point which can be adjusted by varying the degree of evacuation to a temperature where no decomposition occurs.

method is that of steam distillation. When a current of steam is passed into the still, many liquids will pass over into the receiver with the steam at a temperature much below their boiling-point. The condensed water can then be removed from the receiver either mechanically, in the case of liquids immiscible with water, or by heating the distillate to over 100° C. Steam distillation is used principally for collecting essential oils.

Distillation may also be applied to solid materials, as in the dry distillation of calcium acetate for the production of acetone and the destructive distillation of wood and coal for the production of various organic substances. By far the most important type of distillation, however, is that known as fractional distillation, a process applied to separating mixtures of which the components have different boiling-points. The simple distillation apparatus described above is insufficient, and the vapours, before passing into the condenser, pass through a fractionating head, which consists of a long vertical tube attached to the still, and usually expanded at intervals into small bulbs. This ensures that only the more volatile fractions escape at the top of the column, whilst the heavier vapours are condensed and run back to the still. This column of descending liquid meets the ascending vapours, and exerts a scrubbing action, removing the less volatile constituents. Thus, by successively raising the temperature it is possible to obtain the various constituents of the mixture in a more or less pure form.

In many designs of fractionating column there are several condensers connected to the same column at various heights from the still, and it is thus possible to collect several fractions or "cuts" simultaneously. This system is used principally in the refining of petroleum, in fact, the mineral oil industry makes by far the greatest industrial use of fractional distillation.

See The Elements of Fractional Dis-

illation, by C S Robinson (New York, 1930).

Distinguished Conduct Medal (D C M), a British military decoration instituted in 1862 to be conferred upon non-commissioned officers and men for distinguished conduct in the field. Since Aug. 1918 it can be earned only by services in action. The medal shows on the obverse side a military trophy with the royal arms in the centre, the reverse bears the inscription "For Distinguished Conduct in the Field," the ribbon consists of three stripes—red, blue, red—of equal width. Over 24,000 D C Ms were awarded during the World War.

Distinguished Flying Cross, a British decoration instituted in 1918, for gallantry displayed by officers and warrant officers of the Royal Air Force while on active service. It is attached to a blue and white horizontally striped ribbon.

Distinguished Service Cross, British decoration established in 1907 as the Conspicuous Service Cross, and at that time awarded to warrant and subordinate officers of the Navy whose services had been mentioned in dispatches. It was given its present title and extended in scope to include officers up to and including the rank of lieutenant, in Oct. 1914. The Cross is silver, and the ribbon has three stripes of equal width—blue, white, blue.

Distinguished Service Medal, British medal instituted in Oct. 1914 for chief petty officers and lower ratings in the Navy, and non-commissioned officers and men in the Marines, and awarded for acts not quite deserving the award of the Conspicuous Gallantry Medal. The ribbon is three stripes of equal width, purple on each side of a central white stripe bearing a thin purple line. A medal of similar title was instituted in 1907 for the rank and file of the Indian Army. This has a deep violet ribbon with blue border.

Distinguished Service Order, decoration established in 1886, and bestowed in recognition of distinguished services.

in action on the part of commissioned officers of the Army and Navy. The ribbon is red with blue edges. Bars may be won for further distinguished services.

Distress, a legal remedy chiefly used to enable a landlord to recover rent owing to him by seizing goods and chattels which he may find on the premises in respect of which the rent is owed and selling them to satisfy his claim or holding them as security for the payment of the arrears. The right can only be exercised after the rent is in arrears by the person in whom the legal reversion is vested.

All movables may be taken except fixtures, wild animals on the property things in actual use at the time of the distress, e.g. a horse ploughing, perishable goods such as meat or milk, loose money things belonging to a third party, those which have been delivered to a person carrying on a public trade and things in the custody of the law such as goods taken in execution of a judgment. By statute the following things are also privileged: machinery belonging to a third party and lent to the tenant of an agricultural holding under a *bona fide* agreement; live stock lent solely for breeding purposes; the wearing apparel and bedding of the tenant and his family; the tools and implements of his trade, not exceeding £5 in value; the goods of a person insured under the National Health Insurance Acts if he obtains a medical certificate to the effect that the levying of the distress would endanger his health. Certain things such as beasts of the plough, sheep and instruments of husbandry, tools and implements of trade are exempted from seizure if there are sufficient other distrainable chattels on the premises.

See also EXECUTION, REFLEVIN.

Distribution of Animals, Geographical, see GEOGRAPHICAL DISTRIBUTION OF ANIMALS.

Distributism, an economic theory associated especially with the name of H. Chesterton (q.v.) and Hilary Belloc, which advocates property

holding by the largest possible number of persons, the progressive abolition of large capitalism and the factory system, the restoration of small farming, etc. Its organisation is the League for the Restoration of Liberty by the Distribution of Property, commonly abbreviated to The League. It has largely identified itself with the financial theories of Major G. W. Douglas (see DOUGLAS CREDIT SCHEME). Belloc has written on the proposals in *The Servile State* (1912).

District Council, see LOCAL GOVERNMENT.

Dithyrambic (from DITHIRA MBIA), Poetry, a species of lyric poetry said to have been invented by the Dorian Greek Arion (600 B.C.). It was associated with the cult of Dionysus and consequently was of an extravagant and Bacchanalian character. It was sung to wild impassioned music in the Phrygian mode. It was the origin of the Chorus (q.v.) in Greek drama.

Diuretics, medicines which increase the flow of urine by acting on the kidneys either directly or secondarily through the blood or nervous system. The best is caffeine, while squills, infusion of broom tops, sweet nitre and oil of juniper are also useful. Gin may be used as a substitute for juniper. Turpentine and cantharides are effective but drastic. Digitalis is often given as a diuretic in cases of dropsy and saline diuretics to render the urine more watery when there is excess of uric acid.

Diver, a popular name for many diving birds but usually applied to a family related to the auks (q.v.) of which the best known species are the red-throated, the black-throated and the great northern. They are essentially marine, feeding on fish, but visit freshwater lakes to breed.

Dividend, see STOCKS AND SHARES.

Dividing Engine, an apparatus used for the accurate division of linear and circular scales and the production of optical diffraction gratings (see OPTICS). The accuracy of physical

and astronomical measurements depends very largely upon the accuracy with which a standard length or arc of a circle can be divided into parts. This division, until quite recently, has been accomplished entirely by mechanical means, lately accurate methods of measuring length in terms of the wave-length of light have been devised. The dividing engine, however, remains necessary to the graduation of all scales of angle and length used in ordinary physical instruments.

Dividing engines all depend for their operation upon the original graduation of a toothed wheel or screw, by means of which the dividing point, usually a diamond, is made to move by equal steps. When an engine has been constructed with the greatest care, it is further possible to determine its errors and allow for these when using it. For the highest accuracy the work of graduation is necessarily slow. The diffraction gratings (metal or glass surfaces ruled with fine parallel lines accurately spaced) made by Professor Rowland of Baltimore were of such extraordinary accuracy that replicas of them by moulding are still made, although machines for ruling gratings exist in large numbers. One of the greatest difficulties encountered in highly accurate work is the effect of varying temperature, in order to obtain exact results, the machine must be set up in a room kept at constant temperature, and great precautions are necessary to prevent the warmth of the operator's body disturbing the setting. The accuracy with which circles can be divided is about 1 second of arc, while in linear measurements an accuracy of about 0.002 mm is obtainable. By means of automatic machines which perform the complete graduation without attention, scales for commercial use can be divided with an accuracy of about 10 times less than the above.

Divination. The art of divination or discovering sorcerers (see RELIGION, PRIMITIVE) can be traced to Babylon, where *scapulomancy* was a favoured

method. The scapula (i.e. shoulder blade) was roasted over a slow fire until cracks developed in the upper side. The curves, angles, and joints of intersection of these cracks were, to the necromancer, portents for the future. This is sometimes considered the forerunner of modern *palmistry* (*chiro-mancy*) in which the flesh-folds of the hand and wrist are "read" in a like manner. In a recent excavation Sir James Flinders Petrie discovered a huge bone-pit (c. 2000 B.C.) containing the skeletons of hundreds of mules, asses, horses, and men, possibly a war grave, but in all this vast necropolis not one scapula was found. No doubt they had all been removed for purposes of divination.

Another method employed in the Ancient East was *hepatoscopy*, by which marks upon the liver of a slaughtered animal were "read". The casting of a *horoscope*, or history of a life divined from a birth star, is at least as old as the Middle Kingdom of Egypt.

The Roman soothsayers based their prophecy on observations made upon the flight formation of flocks of birds, and, when no birds were visible, by flocks of sheep.

A chief means of discovering a thief in rural England in times not so long ago was the book-and-key trial. A large iron key was placed with its wards inside a Bible, and the book was strapped up tightly with a garter. Then the suspected persons, one by one, were invited to place their fingers under the head of the key. When the key moved the thief was found; and as the nervous trembling fingers of the actual frightened culprit were most likely to cause a disturbance, this method was better than the witch-trial by water. But sometimes, when the person under gravest suspicion touched the key, the watchers might fancy that it moved, even when it did not. Eden Phillpotts, in *The Secret Woman*, describes such an ordeal.

Crystal gazing and *Liquid gazing* are practised all over the world. The clairvoyant, staring upon the shiny

surface becomes auto hypnotised and speaks the mind of the other man under whose influence he is owing to *rappori* through the reflecting medium.

Card reading still fills the gulible with reverential awe. It depends for its technique on the ambivalence (double portent) of each card and combination of cards. For instance Spades may mean either a grave to be dug or a building to be erected and with such hints turning up with every card the unscrupulous or psychopathic practitioner may prattle away for hours.

Exorcism All illness even death is regarded by primitive people as the work of evil magic or demons and most primitive medical practice consists of exorcism or casting forth of devils. The savage witch-doctor after repeating a formula and so casting a spell upon his herbs works himself up into a frenzy howling and gibbering to frighten the Evil One. Not infrequently he beats his patient severely to expel the demon. Then rubbing the sufferer with the medicated herbs he chases what is left of the demon into



Devil Dancers performing their Rites to Drive the Evil out of Sickness

Tea-leaf reading may be classed as a form of divination, in that a power of prognostication is attributed to the arrangement of leaves left upon the sides and bottom of a tea-cup.

Wand divining is still practised. Water diviners walk about holding a y-shaped hazel or stone fruit twig (divining rod) in both hands the tail of the y pointing before them. On passing over an underground spring the stick dips towards the ground. Although this has been attributed to magic it is now widely held that it has some natural explanation.

some conveniently fleshy corner of the patient's body bites hard and spitting out the resultant mouthful of blood into his hands extracts from it a piece of bone or a pebble which he has been secreting.

Not only on Pacific Islands and in African forests but also in Europe until comparatively recently illness was considered the work of demons especially such violent illness as epilepsy and insanity. We retain the expressions seizures and speak of a man possessed.

Epileptic and hysterical fits were matters for holy men to attend to and

thus they did by exorcism, sternly bidding the demon to come forth in the name of God. If the fit was short the demon came forth and all was well. Many old prints in the British Museum depict little flying devils leaving by way of mouth or nostrils. If the patient was insane he was considered wilfully wicked in retaining the demon, and sometimes was chained in a dungeon, starved, beaten, and even burned to induce him to let go his hold, that the good saint might call forth the evil spirit.

Religion and magical beliefs and medical practice are closely allied. In a Shamanistic society the Shaman is priest, witch-doctor, rain-maker, and chief magician. He blesses and curses, casts spells and removes them. He attends every birth, to say which ancestral soul is reincarnated, and every burial to divine the cause of death. He is both obstetrician and sexton.

Only recently in Europe have the three subjects been separated. Hospitals were originally Spital Houses, Hospices, Houses of God's Hospitality, founded by the Church in obedience to the injunction to "care for the sick." Not till late Victorian days would doctors attend to venereal disease, regarding it as a visitation—a punishment from God, a matter for the priest.

Diving, the act of plunging gracefully into water, accomplished in various attitudes. The usual straight dive, head first, called a "plain header," carries the diver to a considerable depth from which he rises by turning his hands upwards. It should be attempted only in water of 5 ft or over. Some of the apparently easy and graceful dives are really dangerous for a novice to attempt, especially the backward somersault. Most graceful is the swallow dive from a considerable height, with the arms outstretched at right angles to the body. The straight-forward plunge head foremost from near the level of the water is suitable for shallow water.

DIVING, see SALVAGE WORK, SALVAGING.

Division, an army formation including all branches of the service, variable in size. A British infantry division is a formation of all arms: it includes 3 infantry brigades, 4 artillery brigades, companies of R.E., Royal Corps of Signals, Tank Corps, and Machine Gun Corps, 3 field ambulances, and various administrative troops, including ammunition and supply columns, divisional train, etc. The composition is subject to variation in accordance with developing ideas of mechanised warfare, the size is normally 10,000 men. A cavalry division consists of 2 or 4 cavalry brigades.

Divorce, see MARRIAGE.

Dixmude, town of W. Flanders, Belgium, 14 m S of Ostend, trades in agricultural produce. It was frequently in the centre of military actions during the World War, and was severely damaged. Pop. 3900.

Djemal Pasha (1861-1922), Turkish politician, member of the Young Turk movement, commanded a division in the Balkan Wars, and the 2nd and 4th Armies during the World War. Was Minister of Marine, 1914 and 1918. On the downfall of the Young Turk Government, 1918, Djemal fled to Europe, visited Russia and Afghanistan, and was assassinated at Tiflis.

Dnieper, Russian river, just over 1400 m. long, rising by the foot of the Valdai Hills, and flowing mainly S to the Black Sea at Kherson. By a system of canals it connects the R's Vistula, Dvina, and Niemen with the Baltic. Its principal tributaries are the Pripiet, Berezhina, Sozh, and Desna, and among notable towns on its banks are Kiev, Mohilev, and Dnepropetrovsk. It divides an offshoot of the Carpathians, c. 30 m S of Dnepropetrovsk, and forms turbulent rapids. It is navigable from Dorogobuzh to the Black Sea, and is free from ice c. 8 or 9 months of the year.

Dniëprostroi Dam, a barrage erected across the R. Dnieper at Kiehkas by the Soviet Government as part of the

First Five Year Plan (*qu*) It feeds the largest power-station in the world with 7 turbines and a capacity of 540 000 kilowatts and 900 000 h.p. (*cf* Niagara 430 000 h.p.) The power is used in large industrial plants throughout S. Russia. The station was opened in May 1932.

Dniester river of S.E. Europe. It rises in the N. Carpathians in Czechoslovakia and flows through S. Poland; it then forms the boundary between Rumania and the Ukraine S.S.R. falling into the Black Sea a few m. from Odessa. It is some 800 m. in length and is navigable from Khotin though small craft can pass the rapids near Yempol and go farther. Important towns on its banks include Halicz, Khotin and Cetatea Alba. It has a large trade in corn and timber shipping.

Doab [*pron* dō ab] Indian name for a tract of country lying between two rivers, particularly applied to the district between the Ganges and the Jumna.

Dobrée, Bonamy (b. 1891) English man of letters. His works include *Restoration Comedy*, *Essays in Biography*, *Restoration Tragedy*, *Life and Letters of Lord Chesterfield* (193) and other literary and critical essays.

Dobrudja, district of S.E. Rumania bounded on the E. by the Black Sea, N. and W. by the Danube and S. by Bulgaria. It is largely a barren country of fens and steppes with a very mixed population. It became Rumanian in 1878 and at first almost valueless, has since attained commercial importance by the steady rise of the ports on the Black Sea. Area 8975 sq. m. pop. 722 600.

Dobson, Henry Austin (1840-1921) English poet imitator of 18th-century styles, revived old French lyrical forms among them the triolet of which he is the acknowledged master. *Vignettes in Rhyme* (1873), *At the Sign of the Lyre* (1875) and *Proverbs in Porcelain* (1877) contain his verse. His critical biographies of 18th-century literary figures are very valuable.

Docetae (dōsētē) early Christian

heretics who held that Christ had not a real human body during His life on earth but only a phantom body. This doctrine logically involved a denial of His human sufferings and therefore of the doctrine of the Crucifixion and Resurrection.

Dock (bōt) unsightly weed (genus *Rumex*, family Polygonaceae) found in all parts of the world and at all altitudes. The properties of the roots and leaves are very different, the leaves being acid and astringent and sometimes of an agreeable flavour while the roots are nauseous and purgative. There are about 10 species of dock in England; the great water dock is a big plant 4-6 ft. high with exceedingly large leaves and several stems which bear numerous green flowers in almost leafless whorls; the broad leaved dock is too well known to need any description; the curled dock has acute curled leaves and is also common; the leaves of the bloody veined dock are tinged with beautiful crimson.

Docks, see HARBOUR.

Dock Warrant, in England certificate of ownership of goods warehoused in docks. The document may be endorsed in favour of a purchaser thus giving him the right to receive the goods.

Dockyard (Amer. *Vary Yard*) Government establishment fitted for the construction, repair, supply and maintenance of warships of all kinds or used for any of these purposes singly. British dockyards are controlled by the Admiralty through Directors of Dockyards, Stores and Naval Construction and through local superintendents. They are situated at Portsmouth, Devonport, Chatham and Sheerness and overseas at Malta, Gibraltar, Hong Kong, Bermuda and Simonstown in addition to minor establishments. A new dockyard at Singapore (*qu*) was begun in 1933. See also **COALING STATIONS**.

Doctors Commons, formed in 1567 and incorporated 1659 was an English society of ecclesiastical lawyers. It was dissolved by the Court of Probate Act

1867 Practice before the ecclesiastical courts, e.g. Court of Arches, held in the Society's buildings, was confined to members.

Doctrine, see DOGMA

Dodder, a genus of parasitic plants belonging to the family Convolvulaceae, with branched, climbing, cord-like stems, no leaves, and globular heads of small wax-like flowers. The seeds germinate in the ground, and the young plants climb the stems of the adjoining plants, and when they have taken root in them lose their connection with the ground. The four English species are all annuals and flower from July to Sept. The Lesser Dodder is found on heath, thyme, milk vetch, potentilla and other small plants, but is most abundant on furze, which it often entirely conceals with tangled masses of red, threadlike stems, the flowers are small, light-flesh-coloured, and wax-like.

The Greater Dodder is a greenish yellow plant found on thistles and nettles, with flower-heads sessile, calyx of blunt sepals, and corolla longer than the calyx, yellowish, enclosing the stamens and styles. The Flax Dodder and Clover Dodder are less often found.

Dodecanese ("Twelve Islands"), group in the Aegean, comprising the 13 (sic) S. Sporades, of which the most important are Rhodes, Cos, Leros, Patmos, and Kolymnos. The inhabitants are mainly Greek, but the archipelago has been Italian since 1912, before which it belonged to Turkey. Area, 976 sq m., pop. 118,000.

Dodgson, Chas. Lutwidge, see CARROLL, LEWIS

Dodo, a huge flightless pigeon, discovered by the early voyagers in Mauritius, but now extinct. It was remarkable for its large hooked bill and tiny wings. An inactive bird, which nested on the ground, it fell a ready victim to sailors, and its extermination towards the end of the 17th cent. was probably accelerated by imported pigs, which devoured its eggs.

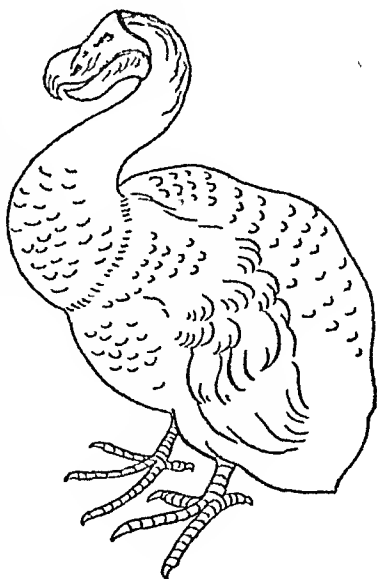
Dodona, the first of the mythical Greek oracles built by Deucalion

after the universal flood. A black dove, which had flown from Egypt, announced that here an oracle was to be built through which Zeus would speak to men. The messages were received through the rustling of the leaves of the sacred oaks and through the clashing-together of hollow vessels suspended close together in the branches, when moved by the wind.

Dog Days, the hottest part of the year, in Europe being part of July and August. Formerly the dog days were specifically the period during which Sirius, the dog-star, rises approximately with the sun.

Doge, the title formerly given to the chief magistrate in the republics of Venice and Genoa.

Dogfish, name for several species of marine fishes closely akin to the sharks. They are usually 2 or 3 ft long, and most of them lay eggs in horny cases called "mermaids' purses," but the



Dodo

species most common round the British coast is viviparous. It is not uncommonly sold for eating as rock salmon. The rough spiny skin is one of the sources of shagreen.

Dogger Bank, Battle of (Jan 24 1916) a naval action of the World War fought off the Dogger Bank between British and German battle cruisers and auxiliaries. The British under Admiral Beatty outnumbered and dispersed the Germans pursuing them until the British flagship the *Lion* was put out of action and her signals misunderstood. The German battle cruiser *Blücher* was sunk.

Doggett, Thomas (d 1741) English



The Start of the Race for the Doggett's Coat and Badge

actor founded the race for Doggett's Coat and Badge still rowed annually by Thames watermen. Doggett presented the prize in 1716 in honour of the accession of George I. The winners' names have all been recorded since 1791.

Dogma, in theology means broadly a religious teaching considered essential to membership of a given body or the fundamental articles of a creed. More properly it refers to theological doctrine enforced as the faith of a particular Church and as most Protestants reject the enforcement of doctrine it would then refer mainly to the tenets of the Orthodox and Roman Catholic Churches.

Dogs are typical examples of the

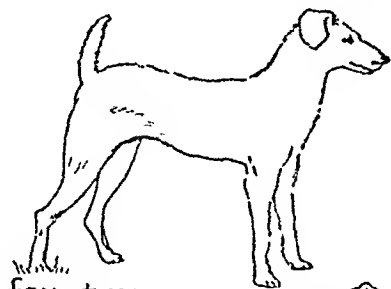
family Canidae of the Carnivora (qv) which includes the fox, jackal and wolf (qv) and all domesticated breeds of dog.

Dogs were domesticated by prehistoric man and Egyptian and Babylonian monuments attest the existence several centuries before the Christian era of breeds closely resembling the greyhound, mastiff and even the Aberdeen terrier and showing considerable departure effected by selective breeding from the wolf, the wild form from which the domestic breeds are believed to have originated.

Dogs were originally tamed for man's service for guarding his possessions and hunting wild beasts and different qualities such as speed, strength and scent were required for different purposes. Many such breeds superior to the wolf in certain particulars have been preserved but the general usefulness of dogs has declined with the advance of civilisation and this has led to the production of large numbers of physically defective breeds, the pet or toy dogs which have little resemblance to any natural species of the family and would have no chance of survival as wild animals.

The exact origin of most breeds is unknown. Their characters however have been stabilised by the Kennel Club and most varieties can be recognised at a glance. It is impossible to enumerate more than the main groups of breeds but the accepted names are misleading and not always indicative of affinity. The chief kinds are hounds which hunt by scent including the bloodhound, otter hound, foxhound, beagle etc; hounds which hunt by speed and sight—the greyhounds, deerhound, borzoi etc; Spaniels including the setter which have much in common with the scent hunting hounds but have long soft coats. Terriers mostly small vermin killing dogs too diversified to define and not necessarily related to mastiffs, St Bernard and Land dog group which have massive jaws and are guard

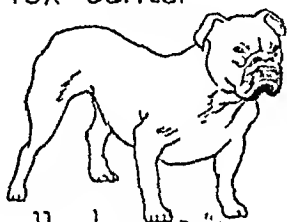
DOGS



fox-terrier



sheep-dog



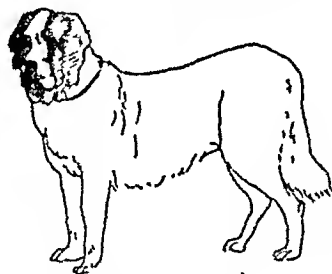
bull-dog



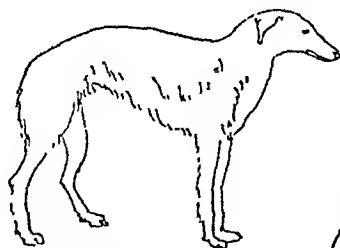
dachshund



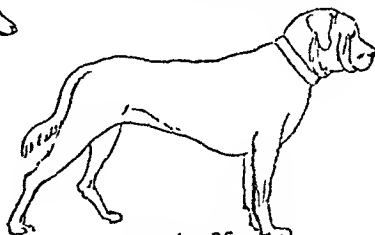
eskimo



St Bernard



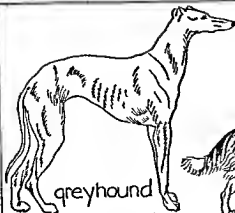
borzoi



mastiff.

(Not drawn to scale)

DOGS



greyhound



setter

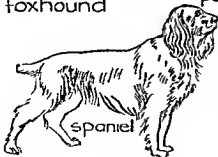


dalmatian



foxhound

pomeranian



spaniel



than sporting dogs. The Eskimo, Samoyede, and chow group, which with their pricked ears and rough coats are wolf-like in aspect, but carry the tail curled over the back, and are principally used for hunting and sleigh-drawing. Some Scotch collies are almost equally wolf-like, but the breed which has most unmistakable resemblance to a wolf is the Alsatian, at present very popular, and used as a sheep dog in its native country.

Many of these groups have dwarfed or "toy" representatives. The modern bull-dog is a degenerate breed derived from the small bull-fighting mastiff of the Middle Ages. Pomeranians are "toys" of the Eskimo dog group, and Pekingese of the spaniel group, while the once fashionable Italian greyhound is a dwarfed form which, curiously, has lost nothing of the elegance of its prototype. See also **ALSATIAN, BULL-DOG**, and other individual breeds.

Dogs, Care of. Housing. The kennel in which an out-door dog is kept should be well built, well ventilated but free from draughts, and light. A good kennel has a brick or tar asphalt floor and high sides, with high-set windows one on each side, so that a fresh current may remove the vitiated air which rises. The windows open inwards, and the inside is protected by projecting side boards from beating wind and rain. Pine sawdust provides a dry, sweet flooring, and wheat-straw, changed daily, makes a comfortable bed. Pine shavings are sometimes preferred to straw, as they are less likely to become inhabited by fleas or other insects, but they are less comfortable. The kennel must be kept scrupulously clean, the floor washed daily, and the whole structure regularly scrubbed with a weak disinfectant.

House Manners. A dog is easily trained to clean habits. Weaned puppies soon learn to go to a tray of earth or sand kept in some convenient corner, if they are placed on it regularly after feeding and at other times

during the day. It is more difficult to teach older dogs, but if they are turned out regularly and fairly frequently, and scolded if they misbehave indoors, they will learn in time. Dogs troublesome at night should be confined in a small space at night for a time and taken out for a run early each morning, as a dog will never soil its bed.

Washing. Dogs require regular washing to keep them healthy and free from skin troubles, and to preserve the appearance of the coat. The dog is placed in a bath of lukewarm water and thoroughly wetted, rubbed with a shampoo to a lather all over, rinsed in clean tepid water, and thoroughly dried. A dry shampoo can be used in very cold weather to avoid risk of a chill.

Food should be given regularly twice a day. For a house-dog the principal meal is best given at midday, but kennel dogs are fed with a small quantity of dry biscuit in the morning and a good meat meal in the evening which helps to keep them quiet through the night. The quantity and kind of food depends on the breed and size. A good general rule is $\frac{1}{2}$ oz. of food for each pound of weight twice a day. One meal should consist of meat, bread, and vegetables in equal parts, with gravy or soup unless the dog is fat, the other of dog biscuit, given whole or broken. Hard biscuit or bones to gnaw helps to keep the teeth in order, increases the flow of saliva, and aids the digestion of food. A plentiful supply of clean water must always be available.

Exercise is essential to keep a dog in health and free from eczema, and should be regular but not overfiring. Walking is the best exercise, to allow a dog to follow a bicycle or car is bad, especially for dogs used for breeding, since it often renders them impotent. A dog out of condition should be given a little slow exercise at first and the amount increased gradually as the muscles strengthen. A sharp walk twice a day over hard roads or rough

ground keeps a terrier in excellent condition. A heavy dog such as a mastiff or a toy dog like a Pekingese should not be taken beyond walking pace. The best times for exercise are before the morning and evening meals with a short run after eating and before going to bed.

The Coat is first changed when a puppy is 9-10 months old. Adult dogs change their coats once a year, soon as the weather gets warm. The change takes about 6 weeks and during this time the dog should be especially well groomed and the old coat combed out.

Nails A dog which gets plenty of exercise on hard ground needs little or no attention to his nails, but a house dog must have them cut from time to time to prevent turning up into the pad which causes lameness. Strong sharp scissors should be used, which do not crack or split the nails as do ordinary scissors. The quick must not be injured; it is pink in colour and heretofore easily seen in white or pink nails, but black nails should be cut very carefully and only a very small piece pared away at a time till the position of the tender is found. The length of the quick varies from one dog to another.

For distemper see **CANINE DISTEMPER**.

Dog Breeding The dog should be carefully selected for his own good points and for the record of his progeny on the show bench. If economy is desirable the bitch may be a well-bred puppy not quite up to show standard. A bitch comes on heat when 8-9 months old and thereafter regularly about every 6 months. The period of gestation is 63 days. The bitch should be treated for worms about a fortnight after the heat has passed off and again a fortnight later. After the 6th week food is given in 3 meals to prevent the discomfort of an overfull stomach after a heavy meal. A fair amount of meat should be included in the diet, but the bitch should not be made fat. Exercise should be

continued as long as she can walk without discomfort but only at a low walk as she nears her time. Just before the puppies are due the bitch should be washed with a weak disinfectant to destroy any larvae of worms. A bitch about to have puppies goes to a quiet place and refuses food and there is a thick mucous discharge. When the labour pains begin she should be left in peace, but if no pups have been born in 2 hours she should be given a little milk containing 10 drops to a teaspoonful of liquid extract of ergot obtained from a chemist. If no pups appear after this a veterinary surgeon should be sent for. After pupping the bitch needs quiet. She should be fed every few hours for some days with a daily increasing amount of meat. If the nipples become swollen or inflamed they should be bathed or 3 times a day with boracic lotion made from half a teaspoonful of boracic acid dissolved in a pint of water and then carefully dried. The pups are able to feed from a dish when 5 weeks old and are gradually weaned at 6 weeks. A distemper vaccine can be injected before the pups are weaned. The feeding of the pups depends on their breed; they require a rich food since the bitch's milk is highly concentrated, rich in casein and cream and more than 3 times as strong as cow's milk. Puppy foods and strong broth are recommended by most dog owners and a fair-sized bone should be given after every meal to be gnawed to increase the flow of saliva and aid digestion.

Consult Cousens F. W. *Dogs and Medical Distinctions* (1932).

Dogs, Isle of, a district within the borough of Poplar, London, surrounded on three sides by the Thames and largely taken up by the W. India and Millwall Docks. The history of the name is uncertain, but it has been suggested that the Royal kennels situated there in the 17th cent. account for it, or that the word is a corruption of **Docks**.

Dogs, Laws relating to. Every person who keeps a dog above 6 months of age must obtain a licence for it from the post office. The cost is 7s 6d, and it expires on Dec 31. A licence must also be obtained from the Ministry of Agriculture and Fisheries if it is desired to import a dog, and this may be given subject to conditions. Every dog while on a highway or in a public place must wear a collar with the name and address of the owner. The police may seize any stray dog found in a public place, and sell or destroy it if unclaimed after notification to the person whose name and address is on its collar, and any person taking possession of a stray dog must return it to its owner or notify the police. Stealing dogs, unlawfully possessing a stolen dog or its skin, or corruptly taking money under pretence of aiding in the recovery of a stolen dog, are all punishable offences. It is also an offence to allow unmuzzled ferocious dogs, or mad dogs, to be at large, or to use dogs to draw carts or carriages. A dog is not regarded as a naturally dangerous animal, and no damages can be recovered for injuries it may do to human beings or animals, except cattle and poultry, unless the owner is proved to have known its vicious propensity—a dog is entitled to its first bite, and in no case can damages be recovered for trespass to land. A dog may be injured or killed if this is necessary to protect a human being or valuable property other than land from attack, and dog spears, traps, and spring guns may be set for the protection of game, provided they are not used to tempt dogs to trespass, and are not dangerous to human life and limb.

The law on cruelty to dogs was altered in 1933 by the provision that, while the maximum sentence of imprisonment remains 3 months, a convicted person may be debarred for life from holding a dog-licence. See also VIVISECTION.

Dog Watch, see WATCH.

Dohnányi, Ernst von (b 1877),

modern musician known as much for his piano-playing as for his compositions. He was born at Pressburg (Bratislava), and became a pupil of D'Albert. He toured as concert pianist in Europe and America, and has written some original works which, however, do not belong to the aggressive "left" school of modernism. Appointed director of the Budapest Academy in 1919, became conductor of the Budapest Philharmonic Orchestra.

Dolci, Carlo (or *Carlino*) (1611-1686), Italian painter, born in Florence. He early displayed an aptitude for painting, and gained wide popularity. His work shows facility rather than genius, and ability to satisfy the prevailing taste. *The Martyrdom of St Andrew* (1646) is considered his best work. One of his paintings is to be seen in the National Gallery, and two in the Pitti Palace, Florence.

Doldrums, see GEOGRAPHICAL TERMS.

Dole, colloquial term applied to unemployment pay. See also UNEMPLOYMENT.

Dolerites, dark heavy rocks resembling basalts, but differing in that they generally occur as dykes or sills (qq v), intruded into other rocks near the surface, and not as volcanic outpourings. They are, on the whole, coarser in texture than basalts. Chief minerals



Dolerites, showing Typical Jointing into Columns.

present are feldspars and sometimes olivine. Other minerals may be present.

he rock being accordingly called divine-dolerite quartz-dolerite by xersthene-dolerite etc. Dolerites are found in the Highlands of Scotland Carnarvonshire and other places in Britain The great Whin Sill stretching from the Northumberland coast to Westmorland is composed of dolerites German petrologists restrict the term dolerite to rocks of Tertiary or later age

Dolgelly Welsh town county town of Merionethshire a famous tourist centre with some small manufactures including tweeds and flannels Lead and iron are found in the neighbourhood Pop 2,000

Dolin, Anton (b 1904) British dancer He studied dancing under Cecchetti Nijinsky and other famous teachers and made his first appearance with Diaghilev's Russian Ballet at Monte Carlo in 1923 in *Daphnis and Chloe* Since then he has appeared frequently in London and Paris in the Russian Ballet and other productions

Doll, child's toy representing a human being The doll is ancient and ubiquitous Children in all parts of the earth at every stage of man's development from savage to civilised conditions have played with puppets made out of various materials Different peoples have connected them with varying superstitions or symbolical significance while the religious use of the doll in Christian times is retained to the present day by the Roman Catholic Church in its representations of the infant Christ in the cradle at Christmas In modern times wooden and wax dolls have been replaced by those with bodies composed of material filled with sawdust and having china heads generally with eyes weighted to close when the doll is in a recumbent position The most popular doll is the most realistic complete with ringlets and eyelashes but in recent years some charming dolls more stylised and less representational and of some artistic merit have been procurable Dolls houses representing all degrees of dwellings in miniature from cottage

to mansion have been a later development in the history of the doll the most remarkable and elaborate example having been produced in post War years when many famous people contributed to the lavish appointments of the Queen's Dolls House

Dollar a silver coin current in various countries at various times The old form is *thaler* supposedly corrupted from *Joachimsthaler* a silver coin equivalent to the 14th-cent German gold gulden and coined from metal mined in Joachimsthal Bohemia from 1616 onwards The thaler continued as a common German coin being the standard unit of the union from 1857 until the substitution of the mark in 1873 The Spanish piece-of-eight (*peseta*) was also known as a dollar and was current in the Spanish American colonies In 1787 the dollar unit divided into a hundred cents was adopted in the U.S.A Its value was expressible in either gold or silver at the rate of 1.15 which was changed to 1.10 in 1825 Dollar notes were issued which were depreciated by about 45 per cent during the Civil War but were eventually brought back to the gold standard A fall in the price of silver caused great difficulties in the maintenance of this ratio which however was retained under political pressure from the West The par rate of exchange on London is 4.866 £ at par the gold pound is worth \$4.866 In April 1933 the U.S.A. compelled by a bank crisis to follow the British example of eighteen months before suspended gold payments The value of the paper dollar soon fell to about 70 per cent of its gold parity and reached the normal rate of exchange with the depreciated pound in July to recover somewhat in the following months Its future course cannot of course be predicted A British dollar is current in Hong Kong and the Straits Settlements (par = 4d) Canada Newfoundland Mexico Argentina Chile and others also have a dollar currency

Dollfuss, Engelbert

cellor of the Republic of Austria, humorously called the "pocket Chancellor" because of his diminutive stature. Born of a peasant family, his intelligence and scholastic ability carried him to the Vienna University, where he specialised in agriculture. He entered the State service in 1928, was



Dr Dollfuss

head of the National Chamber of Agriculture and in 1930 head of the railway administration. He became Chancellor in 1932, when his able handling of the situation that arose owing to the tension between the Socialists and the Heimwehr brought him into prominence. In order to prevent civil war, he dissolved Parliament, and established a virtual dictatorship. With the advent to power of the National Socialists in Germany in 1933, his position became even more difficult owing to the rise of a powerful Nazi Party in Austria, openly supported from across the Bavarian border by Germany, which was working for the absorption of Austria under a National Socialist regime. He took measures to suppress the National Socialist movement in Austria, and organised a powerful frontier defence against German infiltration. He visited England in May 1933 to attend the World Economic Conference. In Oct. of the same year an unsuccessful attempt was made on his life by an Austrian National Socialist.

Döllinger, Johann Joseph Ignaz von (1799-1890), Bavarian theologian and leader of the Liberal section of the Roman Catholics. He became Professor of Theology at Munich 1826. A Church historian of great erudition, he worked consistently for a more liberal attitude towards modern prob-

lems in the Catholic Church. He was opposed to the ultramontane section, disliking the Dogma of the Immaculate Conception, and still more the desire of extremists for Papal temporal sovereignty. He led the opposition, mainly emanating from Germany, to Papal Infallibility. Refusing to accept the decrees of the Vatican Council (q.v.), he was excommunicated. He did not approve of the schism in Bavaria, and worked latterly for Church reunion.

Dolmen, see STONE AGE

Dolmetsch, Arnold (b. 1858), musician renowned for his knowledge of old music and his reproductions of archaic instruments. Born at Mannheim, he was a pupil of Vicuxtemps in Brussels before coming to London to study at the Royal College of Music. He organised festivals of old music at Haslemere, when he and his family earned through programmes of old music on the instruments for which they were written.

Dolomite, or *pearl-spar*, is carbonate of calcium and magnesium. It is found in crystals or in massive beds of rock, occurring either as an original deposit or as a product of alteration, especially of limestone or aragonite (q.v.). When crystalline it somewhat resembles calcite, but usually has distinctive curved crystal faces. It is also harder and denser than calcite, and is not acted on by cold dilute acids, as are most carbonates. The crystals are nearly transparent and usually yellowish white in colour. Good specimens occur in Cumberland, Switzerland, and Missouri. Massive beds are found in the Dolomite Mountains of the Tyrol, from which the name of the rock is derived. This is true dolomite, deposited as such. As a product of alteration of magnesium limestone, it is widely distributed in the Permian beds of Durham and Yorkshire. It is also probably deposited in saline lakes by the action of sodium carbonate, which throws both the calcium and magnesium carbonate out of solution. The same effect is

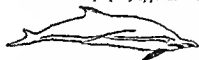
obtained in shallow oceanic waters as at Christmas Island and the atoll of Funa Futi

Again calcareous deposits may contain a little carbonate of magnesium together with a large amount of calcium carbonate and the action of percolating water may dissolve the calcium carbonate gradually until the rock is left with the two minerals in the proportion necessary to form a dolomite

This generally leads to a reduction in volume of the rock, and in fact the magnesium limestone and dolomite of the Permian of England is full of solution hollows and shrinkage spaces

Dolomites, mountain group in the Tyrolean Alps distinguished for its very sharp and brightly coloured peaks formed of magnesian limestone The Dolomites are a popular beauty spot among the best known resorts for tourists are San Martino di Castrozza, St. Ulrich, and Capriè The highest peak is the Marmolata (10 97 ft)

Dolphin, a general name for a great many different kinds of smaller Cetaceans provided with a large number of teeth but properly applicable to



Dolphin

the common dolphin found mostly in the warmer waters of the Atlantic and occasionally in British seas This may



dolphin and anchor

Heraldic Dolphin

reach a length of 6 or 7 ft and is sometimes confused with the porpoise (q v) but differs in having a comparatively slender muzzle or beak It goes about

in shoals feeding on fish and is well known for its habit of swimming alongside vessels

The name is also given by fishermen to a kind of fish related to the mackerel and brilliantly coloured which inhabits the Mediterranean and other seas

Dome (arch) a rounded roof or vault It may be hemispherical, elliptical, ovoid or polygonal Domes, possibly of unburnt brick were used in ancient Mesopotamia The Mycenaean *tholos* or beehive tombs (see EGYPTIAN CIVILISATION) were not true vaulted domes as they were built of concentric stepped horizontal courses each course forming a narrower circle than the one immediately below and the top course being merely a flat slab

The Romans developed the true vaulted dome that of the Pantheon (A.D. 126) being noteworthy The problem of placing a dome over a rectangular room was solved by the Byzantine invention of the pendentive (q v) The dome of St Sophia at Constantinople is lightened at its base by a row of 40 round windows and flanked by a series of half-domes In later Byzantine architecture the dome is often raised on a drum St Mark's Venice has five domes Mohammedan architects adopted the Byzantine dome in the 15th cent the bulbous form appeared exemplified in the 17th cent Taj Mahal at Agra This form was very common in Russian architecture which evinced also a taste for clusters of cupolas round the central dome

Renaissance architects impressed by Roman architecture naturally adopted the dome though Brunelleschi's dome at Florence (1436) is actually an octagonal vault They conceived the idea of two or more shells one of which was to carry the lantern that is characteristic of the period The outer shell was often of wood Outstanding examples are St Peter's Rome (two shells) St Paul's London and the Invalides and Panthéon Paris (three shells) The dome form has become traditional

American State capitals. The dome over the Reading Room in the British Museum covers a larger area than any other, it is 110 ft in diameter, 1 ft more than is the dome of St Peter's, Rome.

Domenichino (pron. DOMINIK'NO) Domenico Zampieri (1581-1641), Italian painter of the Bolognese School, was a pupil of the Carracci. He visited Rome, where he remained for some years, painting frescoes in the Farnese palace, and elsewhere. In 1630 he went to Naples where he died. His work has been classed by Carracci and by Poussin as inferior only to that of Raphael, Correggio, and Titian, and his *Communion of St Jerome* was hung opposite Raphael's *Transfiguration* in the Vatican. Present-day opinion, however, hardly endorses these estimates. Examples of his work hang in the Louvre and in the National Gallery.

Domesday Book, the survey made in 1086 for William the Conqueror of his newly-acquired possessions. Royal officials were sent round to collect details of the value of the manors and of their ownership, and the Domesday Book was compiled from the survey thus made. The result is a document giving considerable details of the social and economic conditions of England at that time. The survey does not cover the whole of England, as for some reason Northumberland and Durham were omitted, as was the still unconquered N.W. of England. The object of the survey was to determine the fiscal rights of the King, and perhaps secondarily, to ascertain the names of the under-tenants whom William was to force to swear allegiance to himself personally, as well as to their immediate overlords.

Domestic Economy, see HOUSEHOLD MANAGEMENT

Domestic Service, the menial work of a household performed by hired servants, usually women, but also including male chefs, butlers, footmen, valets, pages, etc. Domestic servants are usually paid by the month, and a

month's notice is required on either side for termination of contract. In the case of the death or injury of a domestic servant from accident during employment, the employer is liable for compensation. Increasing opportunities for women in other professions, the dislike of long hours and of continuous supervision by the employer, and the fashion for fit and small houses, have led to a decrease both in the supply of and the demand for domestic servants.

Domestic service is at present almost the only occupation in which there is a labour shortage. There were in 1921 in Great Britain 371,682 men-servants and 1,841,571 women-servants, a total of 2,216,256. An annual licence costing 15s is required for every male servant, and the figures for these had dropped to 186,000 in 1930-1.

Domett, Alfred (1811-1887), British colonial statesman and poet, was called to the Bar in 1841. He emigrated to New Zealand in 1842, his absence inducing his friend, Robert Browning, to write *Haring*. Domett occupied successively most of the leading positions in New Zealand, being Secretary in 1851 and Prime Minister in 1862. In 1871 he returned to London. After retiring he wrote his best-known works, *Ranolf* or *Amohia* (1872) and *Flotsam and Jetsam* (1877). He was made C.M.G. in 1880.

Domicile, in law, the country which is the permanent home of a person. It may be defined as the country in which he resides, intending his stay to be permanent, or in which he continues to reside though intending to go away, or to which he intends to return, having left it temporarily. The domicile of a minor is that of his father, or, in cases of illegitimacy, that of the mother; the domicile of a wife is that of her husband. Domicile is sufficient to give the courts of the country jurisdiction over the person there domiciled and is essential in cases such as divorce, thus, no wife can seek a divorce that will be universally recognised as valid except in the country of her domicile.

to her husband's domicile. See also

CONFLICT OF LAWS

Dominic, St (1170-1201) founder of the Dominican (qv) order of friars. His first important work was his mission to the Albigensian heretics 1202-15: he spent his time travelling and preaching to the heretics. The order he founded was approved in 1215 by Pope Innocent III: its first members were taken from the small body of disciples who assisted his preaching to the Albigenses.

Dominica, the largest of the Leeward Islands, British W Indies: area 306 sq m. The climate is healthy and the soil productive: cocoa, limes, fruit and vanilla are the staples. The surface is mountainous (highest peak Morne Diablotin 5300 ft): the island being volcanic in origin and containing the famous boiling lake. There are valuable fisheries and lime products are the main export. The capital is Roseau and the main harbour Ports mouth. **Dominica** was discovered by Columbus in 1493. Pop. 43,000.

Dominical Letter used to denote the Sundays throughout the year: it is to be found in the tables in the *Book of Common Prayer*. The letters A B C D E F G correspond to the first seven days of the year (i.e. Jan 1-7) and the Dominical or Sunday Letter for the year is that which corresponds to Sunday. If for example Sunday falls on Jan 6 the Dominical Letter for the year is F.

Dominican Republic, see *SAN DOMINGO*.

Dominicans, a Catholic religious order founded in the 13th cent. by St Dominic. The rule adopted was strict property being altogether renounced. The Order soon developed a keen theological rivalry with the Franciscans. Many of the leading scholars and philosophers of the Middle Ages were Dominican friars: among them was St Thomas Aquinas. In 1623 their rule as regards ownership of property was relaxed and they became a wealthy Order. They were closely associated with the Inquisition

being zealous in the extermination of heresy.

Dominoes, a game played with a set of oblong bone pieces known as *dominoes cards* or *bones*. The face of each piece is divided by a black line, each half being blank or marked with from one to six black spots or pips. Most domino games are based on *matching* or following suit: i.e. similar numbers must be placed next to one another.

The *Block Game* is usually played by 4 persons, each drawing 7 bones. The first player (usually decided by drawing) plays any piece he likes: preferably one of his longest suit by laying it face upwards on the table. His opponent then matches it: i.e. if the piece played is 5-0 it must be matched with a piece containing either a 5 or a 0. If a player is *blocked* and cannot follow suit he says 'go' and his opponent plays again. When one player has exhausted all his pieces he says 'domino' and scores the number of pips remaining in his opponent's hand. If both players are blocked both hands are shown and the player with the smallest number of pips scores the excess of the pips in his opponent's hand over his own. e.g. if A's hand has 12 pips and B's 7 B scores 5. Game is 50 or 100.

In the *Draw Game* players may draw any number of bones from *stock*: i.e. the pieces remaining after the draw, except the last 2 and must so draw if blocked.

In *Matador* the object is not to follow suit but to make each end total. e.g. a 3 must be played on a 4, a 2 on a 5. Double blank, 6-1, 5-2 and 1-4 3 are *matadors* and may be played at any time whilst a blank only a *matador* can be played. Doublets are not placed crosswise and count only the value of their suit. e.g. double 3 counts 3 not 6 and must be played on the 4. Scoring is the same as for the Block Game.

4H Five or *Five* is a game for 4 players with 5 pieces each. The object is to make the two exposed ends of the line total a multiple of 5 when

this is done that number of pips is scored, e.g. a double 5, or 6-4 played first scores 10, a 5-0 played to this would score 10, a double-blank to that another 10, the total made by the exposed ends still being 10. The highest possible score is 20, with double 6 at one end and double 4 at the other. If blocked, a player must draw from stock. If a player fails to notice a scoring total, his opponent says "muggins," and takes the score himself. When a player goes "domino," he scores the nearest multiple of 5 remaining in his opponent's hand, e.g. if the total value of pips remaining is 12, he scores 10, if 13, 15, and so on.

All Threes aims at making multiples of 3 in the same way.

Domitian, Titus Flavius (A.D. 51-96), Roman emperor, succeeded his brother Titus, A.D. 81. Though profligate in his youth, he later attempted to reform Roman morals, and revised provincial government and the administration of justice. He was the first emperor to assume divine honours in his lifetime. Agricola conquered Britain during his reign. Domitian persecuted the Christians, A.D. 93, exiled the philosopher Epictetus, recalled Agricola, and in 96 was slain by conspirators in his palace.

Domrémy-la-Pucelle, French village in department Vosges, on the R. Meuse, the birthplace of Joan of Arc, the cottage where she was born still exists. There are several monuments to her locally, and the story of her life is acted each year by the inhabitants.

Don, Russian river, rising in Lake Ivan and flowing in a generally S direction to reach the Sea of Azov by a wide delta. In the Don Cossack territory it turns temporarily E and flows within less than 50 m. of the Volga. Its total length is over 1300 m. The main tributaries are the Khoper, Voronezh, and Donetz. It is navigable from Voronezh, and carries a large traffic from Kalach. Closed by ice about four months in the year, and frequently floods in spring. Considerable fishing in the Don provides

valuable exports of herrings, caviare, and salmon.

The Donetz basin, which is rich in coal and iron, has been the scene of feverish development by the government of the Ukrainian S.S.R. In 1930 the Government adopted a scheme for the establishment of 14 industrial cities which were to utilise the vast resources, in raw material, of the basin.

Don: (1) Fellow or tutor of a college at Oxford or Cambridge or a master at Winchester. Probably from Latin *Dominus* = master. (2) In Spain a title comparable to the English "Sir".

Don, Kaye (b. 1892), English racing



Kaye Don

motorist. He established a motor boat speed record of 119.75 m. per hour with the *Miss England* on Loch Lomond, July 18, 1932, beating the record of the American, Garfield Wood, who subsequently, however, regained the record at 127.43 m. per hour on Lake Michigan. Wood beat Don in two international motor-boat races, Sept. 4-5, 1932. Don is prominent in car racing, and has international victories to his credit.

Donatello (1386?-1466), Florentine sculptor, whose full name was Donato di Betto Bardi. He accompanied

Brunelleschi to Rome about 1503. Here he studied classical sculpture for 9 or 3 years before returning to Florence where his beautiful marble *David* was begun in 1408. His *Saints Peter, George and Mark* for the church of San Michele were completed by 1415 and in the years that followed he produced many figures for the cathedral and the Campanile. He also worked in bronze with Michelozzo as partner to do the casting and in relief. After revisiting Rome in 1433-4 he went in 1443 to Padua where he began work on the wonderful monument to Gattamelata. This and the work on which he was engaged for the cathedral of Padua occupied him for 10 years after which he returned to Florence.

Donatello was one of the greatest artists of the Italian Renaissance. His figure studies are evidently carved from life while retaining all the essentials of sculptural form; they aim at no ideal physical perfection and represent human bodies simplified and rhythmic but moving and alive. The figures that he carved harmonise perfectly with their architectural settings while in his relief work he revived an obsolescent art form and brought to it an accomplished mastery seldom surpassed.

Donatio Mortis Causa, in law a gift made in expectation of death and intended to take effect only if death does occur from the existing illness. To be effective it must be accompanied by an actual or symbolical delivery of the gift, e.g. by handing over the keys of a house.

Donatists, 4th-cent. Christian sect in N. Africa. They held that the validity of a sacrament depended not only on the orders but also on the character of the person officiating. This belief came to the fore in their attempt to deny the validity of the consecration of the Bishop of Carthage who had been consecrated by a bishop who had given way to the civil power in the Diocletian persecutions. The Council of Arles 314 rejected the

Donatist position. They were persecuted and the sect declined in power during the 5th cent.

Doncaster town in W. Riding, Yorks. 90 m N.E. of Sheffield on the R. Don. The locomotive works of the L. and N.E. railway are in the town and there is a large trade in agricultural commodities, the corn market being of especial note. The famous racecourse where the St Leger is run is just outside the town. Doncaster was founded by the Romans. Pop. 63,308.

Don Cossack Republic, a district of S. Russia in the N. Caucasian Area with the Sea of Azov as its S.W. boundary. Much of the region is very fertile and agriculture flourishes; cereals, grapes and tobacco are produced and sheep, cattle and horse rearing are of the first importance. Minerals include coal from the great Donets basin, iron, salt and limestone. The R. Don and its tributaries water the whole region which consists largely of elevated plains and steppes. About half the population are Cossacks and other races include Armenians, Greeks, Jews and Tatars. The chief towns are Kamenskaya, Novo-Cherkassk and Rostov. Area 64,000 sq. m. pop. 3,500,000.

Donegal (Tírconail) county in the N.W. corner of Ulster, I.F.S., bounded on the N. and W. by the Atlantic, on the S. by Donegal Bay and on the E. by Fermanagh, Tyrone and Londonderry. The coast is freely indented and there are several harbours, including Ballyshannon, Killybegs and Donaghadee. The natural poverty of the county nullifies their value. Islands include Aran and Tory; in the N. are Loughs Swilly and Foyle. The surface is largely made up of mountains and bogs; notable peaks are Errigal (1,466 ft), Muckish (1,917 ft) and Derryveagh (2,240 ft). The county has very considerable natural beauties and in the last half-century has proved an attraction to tourists. There are numerous small rivers of which the Erne, Finn, Derg and Eask

may be mentioned, the Foyle is on the border of Co Londonderry Agriculture is poor, though a fair number of poultry, sheep, and cattle are raised, some linen is manufactured, and there is a considerable fishing industry The chief towns are Dongal, Letterkenny, Ballyshannon, and Lifford, the county town Area, 1870 sq m, pop 152,508

Donetz, see Don

Dongola Province situated on the banks of the Nile, in Nubia, Anglo-Egyptian Sudan There is a fair amount of arable land by the Nile, and along the Wadi-el-Kab, which obtains its water from the Nile Grain, especially barley, cotton, durra, and dates are grown, and a good breed of horses is raised The two principal towns are Dongola and Merowe Area, 140,000 sq m, pop 58,000

Donizetti, Gaetano (1797-1848), Italian operatic composer, studied music in the Naples Conservatoire, subsequently joining the Army While still a soldier he wrote his first opera, *Enrico di Borgogna* (1819), which was produced in Venice He followed this with another successful opera, and so obtained his release from the Army In 1830 his *Anna Bolena* was produced at Milan with great success, and thenceforward Donizetti began to acquire a European reputation His next important work was *Lucia di Lammermoor*, which had a wonderful reception at Naples in 1835 In 1840 he produced his *Daughter of the Regiment*, which became very popular throughout Europe, and the same year saw the first production of *La Favorita*, one of his finest works Other of his more important operas include *Linda di Chamounix* (1842), *Don Pasquale* and *Don Sebastian*, both produced in 1843 A paralytic stroke in 1844 ended his musical activities, and he died 4 years later Donizetti wrote over 60 operas

Don Juan [pron DON jōō-ŪN or DON KWAIN], the name of a character-type used by Byron (*q v*) among others His invention is ascribed to Molina and he first occurs as a portrait of

patrician imperturbability and libertine scoundrelism in *The Gay Deceiver of Seville*, a Spanish play of 1630 He appears in Molière's (*q v*) *Festin de Pierre* (1665), in an opera by Mozart (*q v*), in which he comes to a suitably horrible end, and in Shaw's *Man and Superman*

Doñmeh, see SHABBETAI ZEVI

Donne, John (1573-1631), English poet, Dean of St Paul's (1621) was the greatest of the "metaphysical" poets His early work comprises satires, lyrics, and elegies, in which brilliant and vigorous thoughts are obscured by far-fetched conceits and frequent harsh if ingenious expressions They are often cynical and sometimes ruthlessly licentious, but his later works, mainly sermons and *Holy Sonnets*, show a reaction against the vices of his youth He was a very popular preacher, but suffered from a certain morbidness of temperament When he knew he was dying, he posed for the sculpture of himself in St Paul's, dressed in his grave-clothes and with closed eyes His work is informed by a fire and vigour that have deeply influenced many other English poets His *Life* was written by Walton, and in modern times by Sir E Gosse (1899)

Donnybrook SE suburb of Dublin, originally a village where a famous fair was held as early as 1204 In later years this became notorious for disorder, and was finally suppressed in 1855

Donoghue, Stephen (b 1885), English jockey He rode the Derby winner in 1921-3, and 1925, also, in 1915 and 1917, when the race was run at Newmarket He was champion jockey from 1914 to 1924, and rode 143 winners in 1920

Door, a wooden or metal structure, moving on hinges or pivots or sliding in grooves, for closing the entrance to a building, room, cupboard, etc Stone or marble doors have been found in ancient tombs To prevent warping, doors have been from time immemorial built up of several pieces, the typical door of framework and

panels having a very long ancestry. Bronze doors and wooden doors covered with decorated bronze plates were used for ancient temples. Wooden Romanesque and Gothic doors often had elaborate wrought iron hinges. Renaissance doors were of richly carved wood or of bronze. The mahogany doors of Robert Adam are typical of English 18th-cent craftsmanship. The modern door is sometimes made flush ~~as~~ without panels. The sliding-door is useful where there is inadequate space for outward swing as in the compartment doors of British railway corridor coaches.

The doorway was often more important than the door itself. The typical doorway of the Aegean civilisation (see) narrowed towards the top though this did not prevent the stone lintels from being of enormous size. Romanesque and Gothic church doorways were formed by a series of arched recesses in the thickness of the wall

leaving a space called the *tympanum* between the lintel and the soffit. The stepped recesses and the tympanum were adorned with mouldings, reliefs and other sculpture. The Renaissance favoured a pair or series of columns or pilasters supporting a pediment. In domestic architecture a fanlight usually appeared above the door. Public buildings were often provided with classical porticoes.

Door furniture (locks, handles, catches, hinges, finger plates, etc.) has varied with the varying style of architecture and furniture. Early oak doors had iron fittings and hinges. The brasswork of the 17th and 18th cents displayed the genius of the period. Heavy Victorian glass and china door knobs and finger plates often finely decorated are now collected as curiosities. Modern door furniture is on the whole sensible and restrained.

Dope, a popular industrial term for the solutions used for the coating of aeroplane fabrics and to a lesser extent leather. The ~~e~~ usually consist of cellulose lacquers when possible. Finishes based on cellulose acetate are used in place of those based on cellulose nitrate as the acetate is by far the less inflammable.

Doppler Effect, the name given to the apparent increase or decrease in the frequency of a train of waves to an observer moving towards or away from the source of the wave or stationary when the source of wave is moving towards or away from him.

This holds good for light and since the frequency or wave-length of light can be determined with extraordinary accuracy the effect is of the greatest value in many branches of science. The stars exhibit spectral lines characteristic of various chemical elements (see SPECTRUM ANALYSIS) but it was found that the wave-lengths of these are nearly all more or less shortened or lengthened as compared with those observed on the earth. This enables us to calculate the rate at which the stars are approaching or receding from



Sir Donoghue.

the earth (see COSMOLOGY, SOUND).

Dorchester: (1) County town of Dorset, on the R 1 route, pop c 10,000. It is a notable agricultural centre and has a brewing industry. There are fine public buildings, including a Norman church and the Grammar School (16th cent). Dorchester stands on the site of a Roman town of which some parts of the walls remain. Max Gate, on the Wareham road was the home of Thomas Hardy. (2) Village of Oxfordshire 10 m S of Oxford, the fine church is partly 13th cent. Founded by the Romans, some of whose earthworks still exist outside the village.

Dordogne, inland department in the S W of France bounded N by Haute-Vienne, W by Charente, S by Lot-et-Garonne, and E by Corrèze. The region is sterile in the N and centre, but agriculture is abundant in the S and S W, the main products being wheat, grapes, tobacco, potatoes, and truffles. There are considerable flocks of cattle and sheep, and large numbers of pigs. The region is watered by the Dordogne (200 m), which rises in the Puy-de-Sancy, and its tributaries. Industries include food preserving, earthenware, flour-milling, and some iron-founding. The leading towns are Périgueux (capital) and Bergerac Area, 3500 sq m, pop 393,500.

Dordrecht, Dutch town, 11 m S E of Rotterdam. It is very picturesque, and was the birthplace of several famous artists: the Cuyps, Ferdinand Bol, Nicolas Maes, and Ary Scheffer, as well as of John de Witt, the statesman. There are sawmills, engineering works, and tobacco factories. The Groote Kerk dates from the 14th cent. Pop 56,000.

Doré [pron DORA], Paul Gustave (1832-1883), French artist, born in Strasbourg, came to Paris at the age of 16, and worked for some time for the *Journal pour Rire*. Although he painted large religious and historical canvases, one of which hangs in the Luxembourg, he is more famous for his illustrations. In 1856 he illustrated

Balzac's *Contes Drolatiques*, in 1866 Dante's *Inferno*, in 1863 *Don Quixote* and in 1865 the *Bible*. Perhaps his most widely known drawings are those done in 1873 for the works of Rabelais in which his inventive power, his satirical and ribald spirit, and his amazing fertility are surpassed only by those of the author himself.

Dorians, a race inhabiting part of ancient Greece, one of the main divisions into which the Greek people were divided. They dwelt in the Peloponnese, where they were the leading race. Their cities included Sparta, Corinth, and Argos. According to tradition they invaded Greece from the N in 1101 B.C. Another tradition states that they came by sea from the E. It is possible that the Dorian invasions took place in the 12th and 11th cents B.C., and were the cause of the fall of Mycenae. (See *AGEAN CIVILISATION*).

Doric Order (arch), the simplest and most imposing of the three Greek orders. Examples are the Parthenon, Propylaea, and "Thesaurus" at Athens, the temples of Hera (oldest known) and of Zeus at Olympia and of Apollo at Corinth. The order was adopted and altered by the Romans, examples are the theatre of Marcellus and the lowest range of the Colosseum. Rome. See also ARCHITECTURE, ORDER.

Dorking, town of Surrey, 25 m S S W of London. Well known as a residential district, and situated in very pleasant country. Lime burning is an important local industry, and a famous breed of poultry is named after the town. Pop 10,100.

Dormouse, a member of a small family of rodents (*q.v.*), resembling squirrels in habit, but structurally more akin to true mice and rats. The common dormouse, found in England, is reddish fawn in colour, and has large black eyes and a hairy tail. It inhabits hedges, feeds upon nuts, acorns, etc., and spends the winter months in profound sleep, rolled up in a nest made of grasses and fixed to the branches of a bush.

D Orsay Alfred Guillaume Count (1801-1857) French wit and gallant D Orsay was born in Paris and served in his youth with the French Army. He became a friend of Byron and the Blounts marrying Lady Blessington's stepdaughter Lady Harriet Gardiner. D Orsay's drawings of the leaders of English society show that he was as accomplished and remarkable an artist as he was in so many other fields.

Dorset, Dukes and Earls of. The title said to have been created by William I has been held by the families of Beaufort Grey and Sackville. **JOHN BEAUFORT** eldest son of John of Gaunt was created Marquess of Dorset in 1399. **EDMUND BEAUFORT** brother was created Earl of Dorset 1442 and died in 1455. **THOMAS GREY** Lord Peters stepson of Edward IV and an opponent of Richard III was created Marquess of Dorset 1475. His grandson **HENRY 3rd Marquess** created Duke of Suffolk in 1551 was beheaded for participating in the Wyatt rising 1554. The title became extinct till in 1604 **THOMAS SACKVILLE** Lord Buckhurst (c. 1530-1608) was created 1st Earl of Dorset. He was Lord Treasurer under James I and wrote *A Mirror for Magistrates* and with Norton *Gorboduc* or *Ferrex and Porrex* the first English tragedy. 1560 **CHARLES SACKVILLE** 6th Earl (1639-1706) was a courtier during Charles II's reign. It was he according to Pepys who first lured Nell Gwyn away from the theatre. A patron of literature he is remembered for his poem *To All You Ladies now on Land* written during the Dutch War 1665. His son **LIONEL CRAWFIELD SACKVILLE** (1693-1763) was created Duke of Dorset in 1710. The title became extinct on the death of **CHARLES SACKVILLE GERMAIN** 5th Duke in 1843.

Dorsetshire English SW county bounded on the S by the English Channel W by Devon N by Somerset and Wiltshire and E by Hampshire. The coast is indented by several pleasant bays including Swanage

Poole Lutworth and Studland and is famed for its beautiful chalk cliffs.

A number of notable watering places including Lyme Regis Weymouth Swanage and Poole lie within the county. Dorset is well watered by the Stour Liddon Frome Yeos and other rivers and is very fertile particularly in the famous Vale of Blackmore. Large number of sheep and cattle are raised and wheat oats barley and turnips are grown. Fruit growing and dairy farming are carried on and freestone and marble are quarried. Smaller industries include silk and paper manufacture poultry bricks and tiles and some silk rearing. There are considerable coastal fisheries.



Corfe Castle Dorset

The principal towns are Dorchester (county town) Bridport Portland Poole Weymouth and Sherborne. Portland is an important naval station.

Dorset part of the ancient kingdom of Wessex and the centre of the Wessex of Hardy's novels successfully resisted the Danes but suffered considerably after the Norman Conquest and thereafter has no outstanding history.

The county possesses several fine churches including Milton Abbey and Wimborne Minster and there are interesting ruins at Corfe Castle and Sherborne. The area of Dorsetshire is 973 sq m and the pop. 239,347.

Dorsetshire Regiment
170 as the 39th Foot the

was the first to serve in India, sailing in 1754. The 54th Foot, raised in the following year, was later amalgamated with it to form the present regiment.

Dortmund, German industrial city of Westphalia, situated 30 m NE of Düsseldorf. It lies in the centre of a great coal and iron basin, and rivals Essen as a manufacturing centre, producing mainly machinery, railway plant, metals, mining plant, and other steel and iron goods. It also trades extensively in wood and corn, and has large breweries. Some of the buildings are of early date, including the Marienkirche, 12th cent, and the town hall, 13th cent. Pop 525,800.

Dory, or John Dory, an edible marine fish with a huge head, compressed body, and long filamentous back fin. The popular name is supposed to be a corruption of *jaune dorée*, meaning golden yellow, or of *jan doree*, meaning golden cock, in allusion to its comb-like fin. On the sides of the fish is a curious dark patch, about which there is a superstition that it is the inherited scar, originally made by the thumb of St Peter, or St Christopher, who handled the ancestor of the fish.

Dost Mohammed Khan (1793-1863), Amir of Afghanistan. He established himself as amir in 1834, but his alliance with Russia led to the invasion of his territory by British troops in 1839. He was deposed in favour of Shah Shuja, but following the British evacuation re-established himself, and formed an alliance with Britain, 1855. He conquered Balkh and Kandahar, and defeated the Persians in 1862.

Dostoevsky, Fedor Mikhailovich (1822-1881), Russian novelist, published his first novel, *Poor Folk*, in 1846. This, together with *The Double* (1846) and *Nelochka Nezvanova* (1849), contained most of the elements for which he later became famous. His sympathy with the oppressed and unfortunate and his interest in psychology and in the morbid, appeared in these works. In 1849 he was arrested for his Socialist views, and sent to Siberia for 4 years, an account of his

life there appeared in the *House of the Dead* (1802). His greatest novels were written in an attempt to pay off his debts. These works include *Crime*

and *Punishment* (1866), *The Idiot* (1869), *The Possessed* (1871), and *The Brothers Karamazov* (1880). Though he was influenced by Balzac, and, to a lesser degree, by Dickens, Dostoevsky was the most purely Russian of all Russian writers.

His deep influence on later novelists of all countries is still felt.

Douai, town in N France, some 18 m S of Lille. It has both industrial and agricultural importance, local products being coal, iron goods, firearms, grain, sugar, and oil. The town was a resort of English Roman Catholics at and after the Reformation period, and gave its name to the Douay Bible (see ALLEN, WILLIAM). It contains a 12th-cent church, and a 15th-cent Hôtel de ville. Douai is notable for the number and variety of its educational establishments. Pop 38,600.

Double Entry, the system of book-keeping by which a transaction is entered in two separate accounts which thus establish a check upon each other. See also BOOK-KEEPING.

Doubs, Department in the E of France, on the Franco-Swiss frontier. Much of the surface is covered by the Jura Mountains, of which Mont d'O (4800 ft) is the highest peak. The principal river is the Doubs (c 260 m) with its tributaries. Doubs is mainly agricultural, staple products including cereals, vegetables, and fruit. A good deal of dairy farming is carried on. Manufactures include machinery, watches, iron goods, and brandy.



Fedor Dostoevsky

lusting Besançon is the capital and other towns are Audincourt Hermoncourt and Montbéliard Area 2000 sq m. pop 305 500

Doughty Charles Montagu (1843-1906) English writer and explorer His most important travels were in Arabia With great courage he ventured from Damascus to Jeddah mingling with Bedouins and pilgrims He describes these adventures in *Travels in Arabia Deserta* (1888) written in a striking prose style based on that of the Elizabethans His love for Elizabethan literature is also reflected in his poems *The Dawn in Britain* (1906) *The Titans* (1916) and *Man and Soul* (1909)

Douglas capital of the Isle of Man situated on the E coast a popular holiday resort Public buildings of note are the House of Keys (the seat of Government) the town hall and the old Castle Mona now an hotel The harbour accommodates ships of fairly shallow draught the town is connected with Barrow Lancs by steamer Pop 19 265

Douglas famous Scottish family Sir William of Douglas joined the Wallace rising against Edward I 1297 and died a prisoner in the Tower of London 1298 His son Sir James the Good (c 1286-1330) supported Bruce won the name Black Douglas through his exploits on the English border and shared the command at Bannockburn 1314 In 1330 he set out according to Bruce's dying request to carry the King's heart to Palestine and was slain while fighting against the Moors in Spain William Douglas (c 1317-1384) was created first Earl by David II 1358 and became Earl of Mar by marriage The best known of the Red Douglasses are Archibald ('Bell the Cat') (c 1449 1514) 5th Earl of Angus and his son Gavin (d 1515) who published the first English translation of Vergil's *Aeneid* In 1633 William 11th Earl of Angus was made Marquess of Douglas his son becoming Duke of Hamilton by marriage The Dukes of Hamilton

now became heirs to the title Archibald 3rd Marquess (1694-1761) was created Duke of Douglas but the title became extinct at his death His nephew Archibald Stuart (1748-1827) was created 1st Baron Douglas 1790 This title later passed to his kinsman Cospatrick Alexander 11th Earl of Home and his descendants

Douglas Lord Alfred (b 1870) English poet and man of letters he has published many volumes of verse of which his *Sonnets* (1909) are the best known and an autobiography (1929)

Douglas Gavin (c 1474-152-) Scots poet and Bishop of Dunkeld was the author of two allegorical poems *The Palace of Honour* and *King Hart* both showing Chaucer's influence His greatest work was his translation of the *Aeneid* the first translation of any classical poem into English

Douglas, Stephen Arnold (1813-1861) American political leader of the Democratic Party Born into a poor family he passed his early years as a cabinetmaker but studied law later and became a barrister in 1834 Entering the political arena he rose rapidly becoming in 1836 member of the legislature of Illinois He was Registrar of the Land Office in 1837 Secretary of State in 1840, Judge of the Supreme Court of Illinois in 1841 and was elected a member of the National House of Representatives in 1843 He came into national prominence during the controversy over slavery He successfully stood against Lincoln in an election for Senator During the Civil War he was an outspoken opponent of secession

Douglas Credit Scheme, financial plan evolved by Major C H Douglas intended to solve the economic anomalies of unemployment and under-consumption Its principal points are withdrawal of the power of credit granting from the banks and its vesting in a National Credit Office and the distribution of a National Dividend to all citizens in the form of credit notes over and above ordinary wages or relief This increase in public

credit, a form of currency inflation, would, it is claimed, provide a stimulus to industrial production by increasing purchasing power

Doukhobors, a Russian religious sect founded by Peter Verigin in the 18th cent. They taught that Christ was the Son of God only in the same sense as all other men, and that the Spirit of God within each man directed his life. They to some extent resemble Quakers. They offended the Russian Church by their religious doctrines, and the Russian State by their pacifism and theoretical denial of government. They were severely persecuted in the 19th cent., mainly for refusal to do military service. Banished to the Caucasus, they were again persecuted when in 1887 military service was extended thither. An agitation against these persecutions, begun by Tolstoy, and materially assisted by the Society of Friends, resulted in their being permitted to leave Russia. They migrated to Canada (1898) and settled there, and are now noted as some of the most efficient farmers in the country, though they have had some collisions with the Canadian Government as a result of their tendency to dispense with the wearing of clothes and the payment of taxes.

Doulton, Sir Henry (1820-1897), master-potter and inventor. His father, John, was the owner of pottery works in Lambeth, London, where Doulton was born. He entered the factory at the age of 15. He perfected the process of enamel glazing. In 1870 the manufacture of Doulton "Art Pottery" was begun, and 7 years later Doulton opened a factory at Burslem, followed by factories at Rowley Regis, Smethwick, St Helen's, Paisley, and Paris. All manner of fine porcelain and china and fancy earthenware is produced at these works.

Doumer, Paul (1857-1932), French statesman. Elected to the Chamber as a Radical, 1888, was Minister of Finance (1895-6) and Governor of French Indo-China (1897-1902). Pre-

sided over the Budget Commission (1902-4) and the Chamber of Deputies (1905-6). He was appointed senator (1912), Minister of State (1917), and Minister of Finance (1921-2 and 1925-6). Elected President of the Republic, 1932, he was shortly afterwards assassinated by the Russian Gorgoloff. Doumer was author of *L'Indo-Chine Française* (1903).

Doumergue, Gaston (b 1863), French statesman and President of the Republic, 1924-31. A barrister by profession, he was elected deputy in 1893, and in 1902 was appointed Colonial Minister. He later held the portfolios of Commerce, Industry, and Labour, 1906-8, and of Education, 1908-10. Became Premier in 1913, resigning on the defeat of his Military Service Law, May 1914. Doumergue then became Colonial Minister in Viviani's war cabinet, reported on the Russian situation, 1917, and in 1923 was elected President of the Senate. The following year he defeated M. Poincaré for the Presidency of the Republic.

Douro, river of Spain and Portugal, rising towards the N of Spain, and flowing generally W to reach the Atlantic just below Oporto. It is c 480 m long, and with its tributaries drains an area of upwards of 37,000 sq m. Navigation is difficult owing to the bar at the mouth, and the rapids in the lower stream. In Portugal the Douro traverses the great wine-producing district of Paiz do Vinho.

Douw, Gerhard (or Gerard Douw) (1613-1680), Dutch painter, was a native of Leyden, and his early training was in engraving and glass-painting. At the age of 15 he began to study under Rembrandt, but soon emancipated himself from any imitation of his master's style, and reverted to the more meticulous methods of the earlier Dutch school. He was a natural colourist, and from Rembrandt learned the skilful manipulation of light and shade which served him well in the candle-light studies which he produced in later years. He painted

portraits interiors and still life The National Gallery London possesses three examples of his work

Dove river in Derbyshire rising near Loxton and flowing mainly S into the Trent For much of its course it is the boundary between Derbyshire and Stafford It is famous for its scenery especially in the district of Dovedale There is good fishing

Dove a bird exemplified chiefly by two species of the pigeon group (*g v*) the turtle dove regarded as the emblem of conjugal affection and the Barbary dove the emblem of peace The former mottled brown in colour is a summer visitor to Great Britain and nests in trees The latter pale fawn or dove coloured with a black collar is a native not of Barbary but of SW Asia and is a favourite imported cage bird

The ring dove is better known as the wood pigeon (*g v*) in fact the term dove is often used for any small pigeon

Dover port on the SE coast of Kent commanding the Straits of Dover the narrowest part of the English Channel It has a huge passenger traffic with the Continent and this together with its commercial activity as a port and naval station is its main source of revenue The dock and harbour works include the Admiralty Pier and the Prince of Wales Pier (which enclose the commercial harbour) the naval harbour an artificial work enclosing over 600 acres and the Wellington Dock Dover has always been a prominent port through its commanding position and the Castle which is some 30 ft above sea level includes the remains of a Norman lighthouse and a Saxon fort In the Castle boundaries is also included the ancient church of St Mary in Castro which dates from before the 11th cent it has been restored and is the castle chapel Dover has many powerful naval fortifications and during the War was the base of the Dover Patrol it is one of the Cinque Ports (*g v*) and was long regarded on the Continent as

the strategic key of England It is a very healthy and well built town and popular as a holiday resort By the Secret Treaty of Dover 1606 Charles II agreed with Louis XIV of France to announce his conversion to Roman Catholicism and to assist Louis against Holland and Spain in return for £ 00 000 a year Pop 41 090

Dover Strait of, the channel which connects the English Channel with the North Sea It covers the area between Dungeness and the S Foreland on the English coast and Cape Grisnez and Calais on the French At its narrowest between Dover and Calais it is 18 m wide

Dover Patrol, a section of the British Navy based at Dover and Dunkirk throughout the World War and commanded first by Rear Admiral Hood then by Admiral Bacon and finally by Sir Roger Keyes under whom it accomplished the blocking of Zeebrugge and Ostend harbours It also bombarded the German lines in N Flanders on many occasions and prevented enemy submarines passing through the Straits of Dover thereby enabling merchant vessels to pass up and down the Channel The patrol included trawlers and drifters to a total of 200 vessels the former swept mines the latter used drift nets to catch enemy submarines

Dowager originally a widow with a dowry now used of widows of high social rank to distinguish them from their sons' wives e.g. Queen Dowager the surviving widow of a deceased monarch

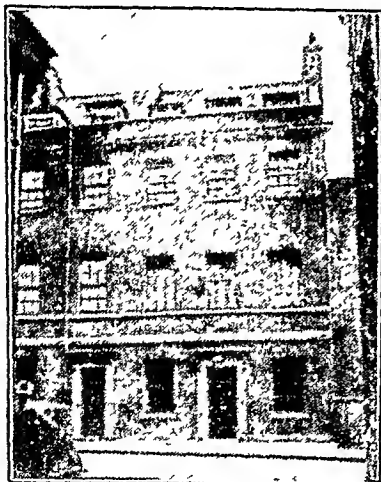
Dowden Edward (1843-1913) Irish literary critic wrote many works on Shakespeare *Shakespeare His Mind and Art* (1875) is a standard work and *Shakespeare's Scenes and Characters* (1886) is also widely read His *Life of Shelley* (1836) is important.

Dower the right which a wife had to enjoy for life a third of the land in fee simple or tail her husband at his death takes it away from

otherwise Dower was abolished in 1925 See also CURTESY

Down, county of N Ireland, in the province of Ulster, lying on the Irish Sea between Belfast and Carlingford Loughs, Antrim is the N boundary, and Armagh the W The coastline has several bays and loughs, the most important being Strangford Lough, with a great number of islets, several with ruined castles and abbeys, all well wooded To the S of the county are the Mourne Mountains The county is generally poor, but in the N there is a fair amount of agriculture turnips, oats, and potatoes are grown, and sheep, pigs, and poultry raised There are considerable fisheries, and the industries include linen and brewing The principal towns are Newry, Downpatrick (county town), Newtownards, and Bangor The total area is 951 sq m, pop 200,228

Downing Street, Whitehall, London, named after Sir George Downing, a



10 Downing Street

politician and diplomat of the 17th cent Downing Street contains the official residences of the Prime Minister (No 10) and the Chancellor of the

Exchequer (No 11), and the Foreign and Colonial Offices

Downpatrick, county town of co Down, Ireland, situated at the SW end of Strangford Lough Linen, agricultural commodities, and tanning are the local industries The cathedral contains the alleged remains of St. Patrick, St. Bridget, and St. Columba. Downpatrick was the ancient residence of the Kings of Ulster, and has many interesting local remains Pop. 3060

Downs, The, two, roughly parallel systems of chalk hills lying in SE England The N. Downs cross Surrey and Kent from near Farnham to the coast, ending in the Dover and Folkestone cliffs They are frequently breached by rivers, and Guildford, Dorking, and Maidstone are among the towns lying in the gaps The highest point is Leith Hill (905 ft) The S Downs, which are similar in structure, stretch roughly from Petersfield in Hampshire E and S to Beachy Head The highest point is Butser Hill (889 ft) Between the two lines of Downs is the agricultural district of the Weald

Dowson, Ernest (1867-1900), English poet, of the "decadent" school, published his *Verses* in 1890 His best-known poem is *Cynara* He was associated with the "Yellow Book" group

Doxology, an ascription of praise to God The Greater Doxology is that beginning "Glory to God in the highest," used in the Church of England Communion Service and the Roman Mass, the Lesser Doxology comprises the lines beginning "Glory to the Father and to the Son," which is generally sung at the end of the Psalms The last verse of a hymn is commonly a Doxology

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Doyle, Richard (1844-1893) English black-and-white artist. His best known work is his design on the cover of *Punch* on the staff of which paper he worked from 1843 to 1850 when he resigned for religious reasons. He illustrated some of Dickens's *Christmas Books* and several of Thackeray's novels. His *Comic History of England* was at one time very popular.

D'Oyly Carte, Richard (1844-1901) English theatrical manager associated with the production of the Gilbert and Sullivan comic operas at the Opéra Comique and later at the Savoy Theatre built by himself in 1891. The D'Oyly Carte Opera Companies played Gilbert and Sullivan all over the world. His son ROBERT D'OYLY CARTE (b. 1876) is the proprietor of the D'Oyly Carte Opera Companies.

Drachma, an ancient Greek silver coin a six hundredth of a talent at first equivalent to rather over 1s but later valued at 9½ in English money. In Athens the chief coin used was the tetradrachmon (4 drachmae). The drachma was also used as a weight about a hundredth part of a pound. In modern currency the drachma is nominally of the value of a franc and is coined in 10 and 50 drachmae pieces in silver and 5, 10 and 20 drachmae in gold. It is divided into 100 lepta. Both drachmae and lepta are used in Cretan currency.

Draco (7th cent. B.C.) Athenian

statesman traditional codifier of the laws of Athens. By his code nearly every crime was punishable by death—hence the word draconian and cative of extreme severity. Aristotle assigns the whole constitution of Athens to Draco but this is now disputed. The laws of Solon (q.v.) superseded the Draconian code except as regards homicide.

Draco see CONSTELLATIONS

Draft, a document resembling a cheque ordering the addressee to pay to some person named a sum of money held by the addressee in trust for the drawer of the draft. A draft is therefore unlike a cheque only in that the cheque orders the addressee to pay out of fund lent to him rather than out of funds merely held by him in trust (deposits in a bank are actually loans to the bank and are therefore withdrawable by cheque).

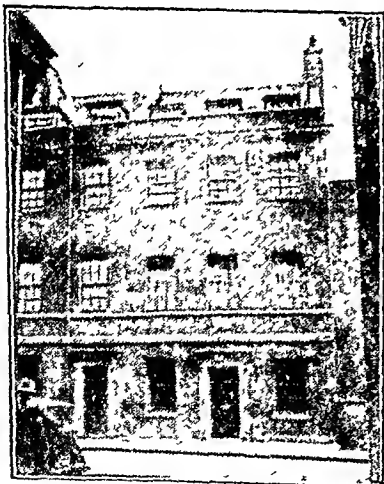
Dragon, a fictitious winged monster with crested head and claws and breathing fire. It appears in folk lore throughout the world. A thousand years or more before the dawn of civilisation in Europe the Chinese and Japanese dragon was believed to be a prehistoric monster inhabiting the land. A solar eclipse is believed by the Chinese to result from the attempts of a dragon to swallow the sun. Christianity accepted the dragon which is mentioned in the Bible (Rev. xii 3-4) as the personification of evil and saints are represented as his conquerors. St. Michael, St. Andrew and St. George (q.v.) each slaughtered their dragon and not only saints but the heroes of legend and fairy story performed similar feats of valour.

Dragons have formed the devices of several English kings. Henry VIII assuming as a badge the Dragon of Cadwallader the Red Dragon Device. In heraldry (q.v.) the dragon figures as a charge, as a crest and as a supporter. The City of London blazoning two in the last capacity. The Welsh is a 7-headed dragon. The wyvern a flying serpent of the dragon type. The lindworm as slain by

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DRAGONS



St George
and the dragon



Japanese
dragon seizing the sun



Crest, dragon's head
crested, collared and chained



a wyvern



the hydra



dragon of
the Apocalypse

Siegried in the *Nibelungenlied* is a wingless dragon.

Recently the name has been fancifully applied to the large monitor lizard (*g*) of Komodo Island which may reach a length of 9 ft.

The term flying dragon has been applied to the extinct flying reptiles called pterodactyls (*g*) and to a little harmless arboreal tropical Asiatic lizard provided with wings formed of skin stretched between its long ribs which it spreads to form a parachute for prolonging its leaps from branch to branch.

Dragon-flies, insects (*g*) of the order *Odonata* with biting jaws large eyes short antennae a long generally narrow abdomen and two pairs of long thin clear many veined wings. Metamorphosis is incomplete. The adults usually found over fresh water in which the eggs are laid are rapacious and feed upon insects caught on the wing. The immature form or nymph hatched in the water some what resembles superficially a wingless adult. It breathes by means of gills at the end or on the sides of the body or by tracheal tubes in the hinder end of the alimentary canal and feeds upon small water animals which are seized by a peculiar modification of the third pair of jaws forming the so-called mask. This apparatus consists of two long segments ending in movable piercing hooks. When not in use it is folded back between the legs but can be thrust out with lightning rapidity to seize prey within reach. When mature the nymph climbs up a reed out of the water casts its final skin and flies away. Dragon flies are found under suitable conditions in most countries.

Dragon's Blood, a red resin obtained from the fruits of several E. Indian trees. The material is a solid soluble in alcohol and fatty oils. It is used in the manufacture of furniture polishes for staining marble and in some types of printing.

Dragoon Guards, six mounted regiments raised at the time of Mon-

mouth's Rebellion (1685) with a seventh in the Revolution of 1689. The 1st Dragoon Guards was called the Kings in 1746 the 2nd the Queens Bays in 1760 the 3rd the Prince of Wales in 1764 the 4th the Royal Irish and the 5th the Carabiniers in 1784. In 1801 it became known as the Princess Charlotte of Wales and the 7th the Princess Royal. The Royal Irish was the first British troops to engage the German in the Great War on Aug. 9 1914.

After the War the number of regiments of Dragoon Guards was reduced to five the 3rd and 6th the 4th and 17th and the 5th and the 6th Dragoon being amalgamated.

Dragoons, originally mounted inantrymen of the 16th and 17th cents armed with *deceps* or short muskets. While inferior in horsemanship to the cavalry the dragoons were much used for guerilla fighting and police work. The 1st Royal Dragoon was raised in 1661 and fought in Flanders under William III at Waterloo and at Balaklava where they took part in the famous charge of the Light Brigade. The Scots Greys were raised in 1683.

Drainage see *SLUDGE DISPOSAL*.

Drake Sir Francis (c. 1540-1596) the most famous English admiral and navigator first showed his skill in sailing in the expeditions of 1565 and 1567 under Lovell and Hawkins respectively. He engaged in many buccaneering expeditions to the Spanish Main and the W. Indies on which he captured and sank many galleons and took much treasure. He died of the



Drake

globe (1577-81) On his return he was knighted and given command of the fleets against Spain, he defeated the Armada (1588) and ravaged the shores of Spain for many years On his last expedition to the W Indies, he died, and was buried at sea He is renowned for bravery, seamanship, and cool-headedness, and has been invested by posterity with the character of the ideal Englishman

Drakensberg, mountain range of S E Africa parallel with the coast, forming part of the edge of the great S African plateau The range separates Oliphant's R and the Great Fish R, and is some 500 m long The principal peak is Mont-aux-Sources (10,763 ft) There are several passes through which railways connect Natal and the Orange Free State

Drama, the name given to that form of literary art whose medium is the representation of human emotions and actions by means of the impersonation of characters by actors performing before an audience a reconstruction, as faithful as the bounds of art permit, of some actual or imaginary situation or episode of human life Considered as a whole, from its origins in a form of religious worship, through the multiplicity of its ramifications in various ages and countries, to its later developments and its offspring, the cinematographic film, the field covered by the drama is of colossal extent, and this article can merely give a general summary of its origins, scope, and various types Its history and development in the literatures of various countries are treated separately under the headings of those countries

The origins of the drama lay in some form of religious festivity. To take the instance of Greek drama, since it bears some direct relation to modern drama, this arose out of the chorus of satyrs about the altar of Dionysus (the Greek Bacchus) to celebrate the exploits of the god in hymns, which became expanded into narrative and thence to dialogue Mediæval European drama, again, though of a

different origin, was in its beginnings still connected with religion, for it sprang out of the liturgical ritual of the Church, the semi-dramatic acts and processions of priests in the celebration of Mass, and the antiphonal nature of parts of the service, which afforded an easy transition to dialogue In this way arose the Mysteries (*qv*) and the Moralities (*qv*), which are the direct parents of the English drama

It is obvious that the matters capable of dramatic representation must be limited to those which can conveniently be reproduced upon the stage, and it is this fundamental limitation which gave rise to the famous rule for the observation of the three "unities"—of time, place, and action—which demanded that a stage play should be restricted in time to the events of a single day, in place to the fewest possible changes of scenery, and in action to simplicity rather than complexity of plot Taste and fashion have from time to time varied as to the strictness with which these "unities" should be observed, and it is obvious that with the improvement of mechanical stage-craft the "unity" of place, for example, may very largely be neglected Apart from merely mechanical considerations, the scope of the drama, as a form of art, is subject to the same general limitations which govern all artistic expressions; but this is not the place to discuss what is, and what is not, a proper subject for art

Classical drama was divided into tragedy and comedy tragedy treating of matters of high and serious import, and moving the audience, as Aristotle said, to pity and terror (*see* CATHARSIS), comedy holding up human folly and frailty to ridicule, and moving the spectators to laughter and mirth But there are many other subdivisions of the drama as we know it The character of historical and romantic drama, for example, is explained by their designation Melodrama, as the word is now used and understood, is a drama of highly coloured, sensational,

romantic incidents although originally the term was correctly applied to a dramatic piece in which music is introduced. Farce (qv) is a development of comedy. Pantomime and ballet have ancient origins and must be included under the general heading of drama. For the cinematographic film an independent existence and future may well be claimed but it is obvious that it is nevertheless directly descended from the drama proper.

Draughts, a game for 2 players played on a board with 64 squares alternately light and dark with 24 pieces or men 12 white and 12 black. A similar game was known in ancient Egypt Greece and Rome and the horsemen of the 11th century modern forms date from the 16th century.

At the beginning of a game the men are arranged as in Fig 1. For recording the squares are numbered as shown in Fig 2. The men move diagonally forwards one square at a time. Black moves first. On reaching any of the 4 squares in the enemy's back or king line a man becomes a king and is crowned by placing another man of the same colour on top. Kings can move either backwards or forwards one square at a time.

Taking If an opposing piece stands on a square to which a man might be moved and has a vacant square beyond him he must be taken by jumping the piece to the vacant square. Any number of pieces may be taken at one move provided there are vacant squares between them and beyond the last one.

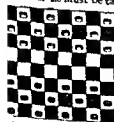


FIG. 1.—Diagram showing Pieces 1 Start of Game

The object of the game is to capture all the opposing pieces, or to confine them in such a way that none can move.

Huffing If a player in a position to capture an opposing piece neglects to do so his opponent may huff (remove from the board) the piece which should have made the capture.

A player taking back his move and capturing the piece or may let the move stand. A good player can always avoid defeat if he makes no mistakes so a perfectly played game must result in a draw. Strategy consists largely in leaving tempting openings which will lure the opponent into a trap. The best opening move was formerly held to be 11-15 but 10-15 9-14 and 11-16 are now considered almost equally good.

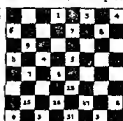


FIG. 2.—Diagram showing Numbering of Board

Polish draughts though intended for a special board with 100 squares may be played on an ordinary draught board. The chief difference is that the men though moving only forwards may capture either forwards or backwards and a king may move any number of squares in either direction.

Drave, an important tributary of the Danube rises in the Tyrol flows through Carinthia and Styria in a generally E direction forms a part of the boundary between Hungary and Yugoslavia and joins the right bank of the Danube a few m. E. of Osijek. Length 465 m.

Dravidian Languages. Under this heading is classed a group of languages spoken in S India and the N of Ceylon the most important member of which is Tamil. So far it has not been possible to discover any affinities between them and any other group of languages.

Drawback, excise tax or import duty refunded when goods are exported or re-exported. See also **TARIFF**.

globe (1577-81) On his return he was knighted and given command of the fleets against Spain, he defeated the Armada (1588) and ravaged the shores of Spain for many years. On his last expedition to the W Indies, he died, and was buried at sea. He is renowned for bravery, seamanship, and cool-headedness, and has been invested by posterity with the character of the ideal Englishman.

Drakensberg, mountain range of SE Africa parallel with the coast, forming part of the edge of the great S African plateau. The range separates Oliphant's R. and the Great Fish R., and is some 500 m long. The principal peak is Mont-aux-Sources (10,763 ft). There are several passes through which railways connect Natal and the Orange Free State.

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filled with perversion—wishes death wishes and other horrors that would distress the sleeper—is watched over by the foreconscious where a process akin to and actually termed censorship takes place the latent contents (death perversion or other wish) being absorbed into the manifest content

The foreconscious (censorship) sometimes unable to cope with the latent content assures the dreamer in the dream that it is only a dream still acting as the guardian of sleep and preventing the dreamer from waking as a protective measure

Besides all these forces the dream is full of symbolism a repressed wish sometimes making itself manifest in a very undisguised form if the symbolism is correctly interpreted

Dreams are essentially egocentric. We do not dream of matters that closely concern anyone but ourselves and if we do not appear in a dream it is because we are represented by some other person or persons

Dredger a machine for removing materials from beneath the surface of water. As a rule dredging is done in order to deepen channels for navigation but it is also though less frequently performed for the purpose of winning the material dredged up either sand for building or for the making of dams or matter containing valuable minerals such as gold and tin. The bulk of the machinery used is generally carried on a vessel or raft but may be stationed on land. The motive power is steam or less often Diesel and other oil engines

The suction dredger operates by sucking the material to be removed through a pipeline and ejecting it either on shore or into a hopper barge. This type of dredger is particularly suitable for sand which is easily removed and settles quickly but the suction nozzle can be provided with means for cutting more solid material and disintegrating it sufficiently to allow it to be sucked in with the water. Powerful jets of water may also be

used for this purpose. It is obvious that such dredgers require rather a large amount of power for their operation but their first cost and upkeep are low

The most commonly used dredger is the *ladder dredger* familiar to everyone from the appearance of the endless row of buckets attached to a chain by which the material is lifted. The bucket ladder is pivoted and can be lowered for the purpose of operation until it touches the bottom. When it is set in motion each bucket as it turns round bites into the earth and fills itself. The material thus comes up practically free from water. Dredgers of this type are frequently constructed with a hopper into which they deliver the material

The *dipper dredger* works with a single bucket or scoop which is lowered to the bottom crused to make a stroke by which it fills itself and then raised to dump the load. The ordinary grab used everywhere on shore for loading and unloading earth coal etc. is frequently also used for dredging. It has a bucket in two halves which can be widely separated dropped heavily on the material to be grabbed then pulled together and raised full of material

Dredging is extremely important in the maintenance of harbours and waterways and in new constructions. It is also much used in reclaiming land. The dam constructed across the Zuider Zee is filled with sand dredged up from the bottom. Suction dredgers are often used in connection with pipelines carrying material inland to build up low lying marshy ground. See also **EXCAVATING MACHINERY**

Dreiser Theodore (b 1871) American novelist and dramatist was a journalist and editor until 1910. He published his first novel *Sister Carrie* in 1901 and immediately gained a great reputation. Other works of his are *The Genius* (1915) *Plays of the Natural and Supernatural* (1916) and *Twelve Men* (1919). But his best known work is *An American Tragedy*

Drawn Threadwork, *see* NEEDLE-
WORK

Drayton, Michael (1563-1631), English poet, published his first work, *Idea, the Shepherd's Garland*, in 1593. His longer works include *The Baron's Wars* (1603), *England's Heroical Epistles* (1597), histories in verse of little poetical merit. There followed *Polyolbion* (1613-22), an exhaustive topographical survey in verse of Great Britain. Drayton's fame rests chiefly on his pastorals and sonnets, which equal in grace and beauty any of his contemporaries, and on his *Nymphidia* (1627). Probably the best known of his poems is *The Ballad of Agincourt* (1607). He was a friend of Shakespeare and Ben Jonson and, according to tradition, made a third in the "merry meeting" that caused Shakespeare's death.

Dreadnought, a class of British battleship, introduced in 1906, and incorporating great improvements in speed and fuel-economy, largely due to the use of steam-turbines for the first time. The most important innovation, however, was in the armament. Instead of having only 4 guns of large calibre, *Dreadnought*, the first of the new class, had 10 12-in guns, no secondary armament, but 27 12-pounder quick-firing guns, and 5 torpedo-tubes. She was 490 ft long, of 17,950 tons displacement, and had a speed of 21 knots. Her introduction made all previous battleships obsolete. All the other Great Powers copied the design, and thenceforth till the World War capital ship strength was measured in dreadnoughts alone.

Dream. The ancients believed that dreams were fraught with prophetic meaning or mystic understanding. In the 19th cent dreaming received considerable attention, and much careful experimental work was carried out. Dreams were declared to be the result of somatic (bodily) stimuli alone, and the strange shapes that inhabit them were supposed to arise from irregular excitation of the psychic content of the cerebral cortex.

In spite of all this wisdom, popular opinion held to the idea that dreams "had a meaning," and that the meaning was hidden behind conventionalised symbols. Strange to say, popular opinion was right and science wrong. Although a heavy meal immediately before going to bed may make one dream, it will in no way influence the content of the dream. Mental and physical indigestion is the real cause of dreams. Formerly regarded as disturbances of sleep, dreams are now called "the guardians of sleep," and to understand something of both the function and their mechanism, we must introduce yet one more component part of the human psyche. In addition to the conscious and the subconscious mind, we have to meet the foreconscious, a sort of buffer-station placed between the two. The facts of the immediate moment are stored in the conscious, the things we can remember at will, but seldom have to do with, are in the foreconscious, while the things we cannot remember at all without psychoanalysis are stored in the unconscious. The three layers of consciousness might be compared to the hand, the lungs, and the heart. The hand, like the conscious mind under normal conditions, does not move till we wish it to do so, and does only what we wish done, the lung like the foreconscious mind, keeps working without any effort on our part but their action can be stopped or restarted at will, whilst the heart, like the unconscious mind, is entirely beyond our control. The foreconscious overlaps both the conscious and the unconscious.

Dreams have been classified as being of three forms: the sensible and intelligible, the possible but unlikely, and the impossible. In the last class places, things, and people are so altered, and engaged in such outrageous performances, that the possibility of meaning seems out of the question.

One theory is that during sleep the conscious mind is seeking rest, and therefore the sleepless unconscious

The toga was ultimately superseded by the *pallium* which originated in Greece. This garment was a mantle as bulky than the toga worn on ceremonial occasions to cover the head as well as the body. The lower orders wore the *cucullus* a hooded cloak of coarse woollen material.

The outstanding peculiarity of the Anglo-Saxon dress after the Roman occupation was the bandaged leg covering or stocking with which the legs were criss-crossed and knotted at the knee. These were worn with a simple decorated tunic reaching as far as the knee and girded at the waist. Cloaks of varying amplitude were usually worn over the tunics. Women's dress consisted of a long gown reaching to the feet sometimes with a shorter over tunic a wide mantle or hood completing a costume not unlike that worn by nuns to-day. With the Norman conquest short tunics were worn with drawers called *chausses* stretching down to the foot and sometimes bandaged diagonally in the Anglo-Saxon style. This comparatively simple dress later became more elaborate both as regards ornamentation and design until during the reign of Rufus the favoured fashion particularly in Court and ecclesiastical circles was one of long sleeves and flowing gowns while even the closely-cut hair introduced at the time of the Conquest disappeared and was replaced by beards and flowing locks. Women's dress likewise became more elaborate excessively wide sleeves and tightaced waists being favoured. The dress of the humbler people however remained practically unaltered.

At the beginning of the Plantagenet period high boots with stockings and gloves worn by State and ecclesiastical officials were introduced. In other respects the style of dress during the reigns of Henry III and Edward I was simple and dignified the materials used being of the finest possible kind. During the reign of Edward II however important innovations appeared in the dress of the

courtiers which spread throughout the country during the succeeding reign when the dress of all classes became more elaborate. Wimples various kinds of hoods pointed shoes and the flowing head dress called the *contoise* became popular while gayer colours and greater ornamentation were the rule. Dress of this period reached its limits of gorgeousness in the apparel of the jousting knights. One ubiquitous and long lived variation of the hood was the *liripe* a long attenuated appendage extending from the hood down the back and then carried over the arm. The hood was also to be seen with extended points at each side from which bells were hung in the manner of the jester's cap. The *cotehardie* a jacket fitting tightly to the body and extending half way between hips and knee became the usual male garment and the foundation of many additions and elaborations. The *cotehardie* was frequently part-coloured with the sleeves elongated by means of tippets or long streamers attached to the sleeves and hanging from them. A girdle was worn but always below and not round the waist. The hose worn by men were similar to what are known as tights to-day. The *cotehardie* was also worn by women as the upper part of a flowing gown.

It was trimmed and elaborated in various ways but its essential shapelessness and beauty never seems to have been obscured. Seldom at any other period of dress do costumes possess more beauty and dignity of line than do these garments of the 14th cent. In the reign of Richard II the *cotehardie* became abbreviated into the *jacquette* which extended hardly farther than the hips. From France came the *houpelande* an ample gown with long sleeves and high collar. Both the *jacquette* and the *houpelande* were richly ornamented by the nobility with heraldic or other devices. Apart from the hood various caps and hats the latter with turned up brims and feathers were often worn by men.

(1926), in which his characteristically heavy and elaborate prose style is used with powerful cumulative effect.

Dresden, capital of the State of Saxony, Germany, situated on the Elbe. It is divided into two main sections: the "old city" (Altstadt) on the left bank, and the "new city" (Neustadt) on the right. The city dates back to the early 13th cent. It passed successively through the hands of Henry the Illustrious (1270), and Wenceslaus of Bohemia and the Margrave of Brandenburg. In the early 14th cent. it was restored to its first form, when it came into the possession of the Albertine family, which held it until the proclamation of the republic after the World War. It suffered during the Seven Years' War and the Napoleonic Wars, in 1919 there was a great deal of street fighting in the city.

Dresden, which is a great artistic and tourist centre, has many notable buildings, including the Royal palace, the Roman Catholic Hofkirche, the Opera House, the Martin Luther-Kirche, the Town Hall, and a number of museums. The picture gallery contains valuable examples of all the notable schools, and the public library has more than 400,000 books. Manufactures include pianos, scientific instruments, leather goods, chemicals, and agricultural machinery, and a large trade is done in books, works of art, etc. Of special interest is the manufacture of china (see CERAMICS) and pottery. The city's position on the Elbe, and as the centre of an important railway system, has contributed greatly to its growth in the present century. Pop (1931) 677,932.

Dress. The origins of dress lie partly in man's primitive reactions to climatic conditions and partly in his desire to adorn his body in a manner to give pleasure to himself or to others. The conventions that inevitably surrounded the wearing of bodily coverings and adornments have been responsible for the belief that the impulse to clothe the body arose out of

modesty, but modesty itself is a matter of convention and geography. The supposition that climate was an important factor in the origin of dress would seem to be confirmed by the fact that trousers evolved in countries at a time when they were unknown in the S. The Eskimo women to the present day clothe themselves in trousers, while the men in the tropics retain the waist-garment.

Trousers to-day are regarded as a symptom of civilisation, but in ancient times the situation was reversed. While the civilised Romans favoured the toga, the barbarians with whom they came in conflict surprised them by wearing trousers. They found the ancient Britons wearing similar garments when they landed in England, and it is a notable fact, that though British dress became romanised during their conquerors' occupation, the inhabitants reverted to trousers after their departure. The dress of the ancients, previous to the coming of the Romans, consisted simply of a close-fitting coat worn with trouser-like garments christened *bracæ* by the Romans. A cloak of Celtic origin was also worn. This cloak reached to the knees and the *bracæ* were gathered in round the ankle. The toga, which was introduced by the Romans, is thought to have been semi-circular in form. It extended as far as the right elbow, but on the left arm it reached as far as the wrist. One end of the toga was slung over the left shoulder and the rest wound round the body. It was disposed in different fashions at different times and varied in colour and ornamentation according to the status of the wearer, but as the typical Roman dress it remained in favour and essentially the same until the capital was removed to Constantinople. The tunic, worn under the toga, resembled the early Greek *chiton*, a simple garment extending half-way to the knee, a longer variety of which was worn by women. Cloaks with hoods were often worn as a top garment.

he coat was usually long with wide turned back sleeves. The long waistcoat was worn underneath with a lace cravat.

Women's dress at the end of the 17th cent. was comparatively simple being mainly an affair of moderately ill gowns, long waists and low collars. In the 18th cent. however women's fashions were to reach heights of extravagance not exceeded at any other time in the history of dress. The hoop-petticoat which appeared in the first year of the century had by the middle grown to enormous proportions. As this inconvenient fashion became less extreme an even more extraordinary vogue affected women during George III's reign. This was the universal infatuation among women of fashion for fantastic head erections in the form of lofty and ornate wigs decked with feathers, beads and trimmings of varying degrees of absurdity. As these monstrous head-dresses were carefully reserved in their original elaborate state sometimes for weeks the unsightly aspect of the fashion is obvious. The male attire during the greater part of the 18th cent. showed no fundamental changes. Long raised skirted coats, waistcoat, breeches, stockings, shoes powdered and 3-cornered hat were worn with unimportant variations. The wig as an article of attire disappeared before the end of the century. This period is notable for the rise of one of the most famous leaders of fashion in dress, George Bryan Brummell, who was born in 1778 and became a crony of the then Prince of Wales (afterwards George IV) was the oracle of his time in matters of dress and his various conceits were slavishly emulated by the fashionable youth of the period. As Beau Brummell he has won fame as the foremost English dandy. An important change in women's dress was introduced with the close of the 18th cent. when the extremely high waist and narrow skirts of the attractive Empire style

became general. Men's breeches became tighter and as with women shorter waists were emphasised by the more abbreviated waistcoats. Later short waistcoats were worn with tight trousers strapped under the instep. Cutaway coats and elaborate cravats were the rule.

With the coming of Victoria the inoffensive style of women's dress which had been in vogue during the early years of the 19th cent. gave place to a succession of fashions whose variety was only less remarkable than the ugliness common to them all. The volumes of *Punch* are an interesting if depressing commentary on this period. The most famous Victorian fashion was the crinoline which arrived from France c. 1850. Previously dresses had been full and had been worn with the bonnet and shawl but they now recalled the fashionable excesses of the middle of the previous century. At the beginning of the seventies the crinoline had disappeared its place being taken by a skirt almost equally extreme in its tightness and adorned with the artistic bustles. Tight lacing became the ordeal of every fashionable woman. Mrs. Bloomer (1818-1894) was responsible for one of the vagaries of Victorian dress when she instituted her campaign for the adoption by women of the article of attire which became known by her name. During the eighties Gilbert

Greenery, gallery Grosvenor Gallery, aesthetes led by Oscar Wilde in effable in his velvet and lilies denounced the hideous style and ugly materials of the time and advocated the wearing of clothes whose simple lines good colour and fine materials gave them some claim to beauty. The aesthetes gained much notoriety but few adherents and during the latter part of the Victorian and the whole of the Edwardian eras women's dress was over-elaborate and unartistic. Hats during the latter reign were afflicted with an exaggeration comparable to that of the mid 19th and 18th cent. skirt vogue. Merry Widow hats were

while the hair itself usually hung round the head as far down as the chin, and was parted in the middle. A favourite style with women was the inverted isosceles triangle effect which was given by the wimple being drawn up under the chin over the outstanding buns of hair on either side of the head.

In the 15th cent the pure lines of the 14th cent became obscured by the exaggerated features that were introduced by excessive padding and elongation of the narrow gowns. Men's hats made of beaver or velvet were worn in various fantastic shapes, but about the middle of the century the simple *bonnet* (the Scots Balmoral bonnet of to-day with the addition of a turned-up brim) was introduced from France and enjoyed a long popularity. A remarkable development was the *hennin*, or cornet head-dress, whose principle was that of an elongated cone reaching in some cases an inordinate length, and from which hung elaborately arranged veils. The elongated shoe of the 14th cent had by the end of the 15th cent become shortened to practically the normal length of the foot. The high boot from which breeches eventually developed was introduced c 1450 for the first time.

In the 16th cent the headgear of women was less extravagant. Married women were distinguishable from unmarried by the coil, and the length of their dresses was governed by the wearer's rank, various laws being passed during Henry VIII's reign as to what could and could not be worn by his subjects. Shoes departed even farther from the elongated style, and became square-toed. The male dress of this period has been made familiar to us by the portraits of Henry VIII, who set the fashion for the jerkin with artificially broad shoulders, the doublet with ruffled shirt beneath, and slashed hose. The common people wore a costume essentially the same, but without the trimmings, slashings, and affectations of the nobility. *Æsthetically*

it was preferable, being attractive, simple, and dignified. The first intimations of the characteristic Elizabethan ruff are noticeable during the reign of Edward VI, when it first appeared as a modest collar with frilled edge. As the ruffs grew wider waists grew narrower, until in the many presentments of Queen Elizabeth we see the extremely fashionable woman of her time. The face framed in an elaborate ruff of starched cambric, the waist is drawn in, and its slenderness emphasised both by the pointed stomacher and the great width of the full skirt. The ruff continued in use throughout the reign of James I, but with the first Charles it disappeared, and the favourite neckwear became the wide lace collar extending over the shoulders.

The dress contrasts of the 17th cent are most strikingly exemplified by the Puritan and the cavalier: the one with his familiar tall, wide-brimmed hat, short hair, and simple tunic, the other with his flowing hair and his garments and headwear belaced and befeathered. Charles I introduced an even more extreme style of dress. During his reign the fashionable male loaded his hat with feathers, decorated his calves with bunches of ribbons, and widened his sleeves and breeches. Two important innovations of this century are the vest, introduced by Charles I, and the forerunner of the modern waistcoat, and the wig. This latter came from France, where Louis XIII was the first to wear it, and for long was an indispensable article of attire for men of fashion. The *perruque* or *periwig* is found in various styles and sizes until the end of the 18th cent, when its use became restricted to the professional classes. Beginning with the middle of the 17th cent male dress is fundamentally modern in style, though superficially this may not be apparent. But the coat and waistcoat, however unlike their modern descendants they may have been, were now in existence.

The following are the gowns worn by graduates of the universities of Oxford Cambridge and London

Oxford University

All Bachelors and Masters Gowns are black The BA hood is edged with white fur the MA hood is lined in red Doctors Gowns are as follows

D Litt Scarlet cloth trimmed with grey silk

DD Scarlet cloth trimmed with black velvet.

black ribbon round with the exception of the DD who wears a black velvet College Cap with tassel

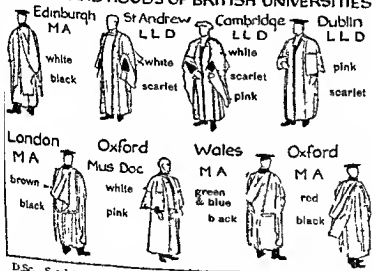
Cambridge University

All Bachelors and Masters Gowns are black The BA hood is edged with white fur the MA hood is lined in white Doctors Gowns as follows

D Litt Scarlet cloth trimmed with scarlet silk

DD Scarlet cloth trimmed with pink and violet shot silk

GOWNS AND HOODS OF BRITISH UNIVERSITIES



D.Sc. Scarlet cloth trimmed with grey silk.

D.C.L. Scarlet cloth trimmed with crimson shot silk.

M.D. Scarlet cloth trimmed with plain crimson

D.Mus Cream damask trimmed with cherry-coloured satin

Ph.D. Scarlet cloth trimmed with blue silk

Bachelors and Masters wear black College Cap with tassel Doctors

wear black velvet Beef-eater Hat with

D.Sc. Scarlet cloth trimmed with pink and blue shot silk

LLD Scarlet cloth trimmed with light cherry silk

M.D. Scarlet cloth trimmed with mil cherry silk

D.Mus Cream damask trimmed with cherry satin

Ph.D. Black gown trimmed with scarlet

Bachelors and Masters wear black College Cap with tassel

Doctors wear black velvet Beef

worn, whose brims were of such dimensions as to make the boarding of an omnibus an awkward business. The antithesis of this vogue has been seen in recent years, when fashion has favoured minute hats perched perilously over one ear.

The fitness for purpose factor in women's dress which of necessity received such a stimulus during the World War has, after a period of reaction against very short skirts, resulted in a style of dress elastic enough to allow of individual expression and innocent of vulgar ornamentation and exaggerated lines. It is safe to say that more beauty in women's dress has been evident in the last decade than at any time since the years of the elegant early 19th cent.

In 1933 more women began to appear in trousers, and the first woman golfer in trousers played that autumn on the links at Westward Ho!

Men's dress during the Victorian times developed into the coat, trousers, and waistcoat, varying little during the reign and differing only slightly from the male attire of to-day.

European National Dress In Great Britain the most notable national costume is that of the Highlands of Scotland. This consists of the kilt (*qv*), the short pleated skirt of tartan cloth reaching to the knees, a jacket with plaid—a large piece of tartan cloth fastened with a brooch to the left shoulder, a feathered bonnet, the sporran or purse hanging in front of the kilt, stockings and shoes, usually Highland brogues. After the rising of the '45, Highland dress was forbidden to be worn by Act of Parliament, the penalty for infringement being 6 months' imprisonment for the first offence and transportation for the second. The Act was repealed in 1772.

The less beautiful, but attractive Tyrolean costume has not yet been superseded by modern attire. It consists of short trousers and jacket, little round hat with ornament, woollen stockings sometimes in two parts, the

space between the ankle and calf bare, and shoes. In Holland the familiar clogs and wide trousers of the men and the wide high-waisted dress and winged caps of the women may be seen displayed at such places as Volendam. The Welsh costume which has virtually disappeared, is remarkable for the high "steeple" hats worn by the women. The costumes of the varied mid-European peasantry are often very elaborate and though not habitually worn, are to be seen on festive occasions. The tendency everywhere, however, with practically no exceptions, is for standardisation in dress, a process made inevitable by modern conditions.

Dress, Academic. It is undecided whether the gowns of university graduates and undergraduates are derived from the ecclesiastical clerk's costume worn by the medieval scholar or from the ordinary civilian dress of early times. The long gown of a clerk and the tonsure were required as early as the 11th cent., and these were supplemented by the college liveries, of which the varying colours and shapes still persist in the undergraduate gowns at Cambridge. In early times the same robe was worn by all scholars, though the richer probably added fur linings, and the gowns of masters tended to become longer and more flowing than those of bachelors. The cape had its origin in the ordinary clerical mantle, and is now worn by the Vice-chancellor and certain regius professors at Cambridge, upon special occasions. The hood, on the other hand, was originally a normal article of clothing, worn by all, including scholars. In later times various linings, of white or miniver, were introduced for distinction of seniority among masters. Academic head-dress was originally of three types, the round velvet cap now worn by doctors being the oldest. The square cap was introduced from Paris in 1620. Academic dress was much restricted and sobered in design and richness at the Reformation.

ly worn by the soldiers of the Stuart period developed in Marlborough's time first into the three-cornered hat and later into the cocked hat. The ample skirted coat remained until the end of the 18th cent. but became narrower and shorter until it became no more than a jacket necessitating the addition of a great-coat which its original ample style had till then rendered unnecessary. The close of this century also saw the substitution of the breeches by the long tight trousers of the early 19th cent.

A certain dashing elegance was now apparent for the first time in military uniform. Distinctive and striking caps, helmets and busbies were worn by the Lancers, Dragoons and Hussars and are still worn with the full-dress uniforms of such regiments. The tunic and the shako were introduced later in the 19th cent. but the latter was abolished in favour of the spiked helmet.

The development of modern warfare during this century made the unsuitability of full-dress uniform for active service increasingly apparent until the painful lesson of the S. African War resulted in the introduction of khaki for service dress which during the World War was exclusively used in the British Army. In recent years however certain regiments such as those of the Brigade of Guards have been permitted to resume full dress so that London is again made gay by the steel cuirasses and plumed helmets of the Household Cavalry and the red tunics and huge bearskins of the Foot Guards while at such military displays as the Aldershot Tattoo the picturesque full-dress uniforms of many cavalry and infantry regiments are displayed with magnificent effect.

Two uniforms which are comparatively new are those of the Royal Air Force and the Royal Tank Corps. The full-dress uniform of the R.A.F. consists of a blue single breasted tunic and trousers with a plumed fur and leather cap while the service dress is also of blue cloth consisting of tunic, breeches and peaked cap. On foreign

service khaki drill and helmet are worn. The most distinctive feature of the Tank Corps uniform is the beret which is worn by no other corps in the British army.

Naval. The distinctive blue and white colourings of the naval uniforms of to-day are no older than the time of George II who was responsible for their adoption. Sailor's dress had up to then consisted of various miscellaneous outfits which had in the early 18th cent. developed into a conventional garb for seamen of wide trousers or breeches, jackets, shoes and a flat three-cornered hat. The new uniform included long trousers usually white and blue jacket, waist coat and towards the end of the 18th cent. when the pigtail fashion was initiated a kerchief from which the wide collar worn by sailors to-day derives. Various regulations during the late 18th and first half of the 19th cents. established the uniform of officers and men along the lines which govern its design to the present day.

Dressler Marie (b 1871) popular



Marie Dressler

POSVI DEVM ADIVTOREM MEVM

FRANCISCA

[illegible]

De la Compañia de San Sebastian

100

documents incriminating Dreyfus and in Sept 1893 the Court of Appeal ordered a fresh trial which took place at Rennes 1893 Dreyfus was brought back from Devil's Island. He was again convicted but pardoned immediately afterwards. The whole affair caused years of convulsion in France and continued agitation in Dreyfus's favour led to his final rehabilitation in 1906 the convictions being quashed. Reinstated in the Army as Major he served in the World War becoming Lieutenant-Colonel and officer of the Legion of Honour. He has since lived in retirement.

Driers, substances added to drying oils (see) to increase their rate of drying and make them more suitable for the manufacture of varnishes and paints. Driers are substances which act catalytically (see CATALYSIS) and the materials more frequently used are the soaps (i.e. fatty acid salts) of heavy metals like lead, cobalt, and manganese. The rosins and abietates of these metals are also employed.

Driffield, town in the E. Riding, Yorks. 40 m N of Hull. Principally an agricultural market with some small manufactures. Pop 5916.

Drift, general name for the very varied deposits due to the ice-sheets of the Quaternary Era. In Britain these have been divided into ancient drifts and newer drifts. The former occur in East Anglia and in the fens, and owing to prolonged denudation, have lost their original configuration to a large extent. The latter are usually found in much the same condition as when they were deposited and are useful guides to the position and direction of movement of the ice-sheets and glaciers. The term "drift" is also loosely applied to all glacial Quaternary deposits. See BOULDER CLAY ERRATICS.

DRILLATION
Drill, apparatus for making holes in material by the rotary or semi-rotary motion of a bit. Until very recently metal was drilled by means of bit consisting of a steel rod flattened

at the end and there tapered to a blunt angle with two cutting edges. A very great improvement was the 18th-cent invention of the *twist drill*. A deep channel is cut in a rod of steel of uniform section the end being ground off at a very obtuse angle giving two cutting edges and a very short point whose bluntness limits the speed of drilling. The standard point angle is 110°. The twist drill is made in very small sizes such as are used in watch-making up to some several inches in diameter. The speed of drilling varies with the diameter of the drill and the material. The use of modern high speed steels for twist drills is increasing but on account of the difficulty of manufacture they are much more expensive than ordinary carbon steel.

A drill in good condition and running true will be extraordinarily accurate but to attain the highest degree of exactness a hole is drilled slightly smaller than is required and finished by a *reamer* a steel rod with longitudinal fluting which scrapes the hole out to an exact size.

Very hard and brittle materials cannot be effectively drilled by drills of this type though glass can generally be drilled by a hard twist drill moistened with turpentine. It is however better to use a rapidly rotating copper tube fed with carborundum emery or diamond powder and supplied with plenty of turpentine or water. Larger holes are drilled in rocks and other hard materials by means of *percussion drills*. The principle of this drill is well known from the domestic tool used to make holes in walls for the insertion of screws. It consists of a hard steel bar generally of hexagonal section with a cutting point of six or eight edges radiating from the centre. Water is forced through a small hole down the centre. The drill is operated by a rapid succession of hammer blows delivered by compressed air or electrical power. At the same time the bit is slowly rotated and thus pulverises the material in front of its point. A similar type of drill but with the drill

film star, was born in Canada. She acted on the variety stage in the United States at an early age, and came to London in 1907, where she was concerned with unsuccessful ventures at the Palace and Aldwych theatres. She was one of the first screen actresses, and won great popularity in talking films. Successes include *Anna Christie*, *Min and Bill*, *Emma Tugboat Annie*, and *Dinner at Eight*.

Dressmaking For satisfactory dressmaking in the home, it is essential to have a reliable pattern. Having obtained this, pin the parts together and fit it. Any lengthening or shortening of the skirt pattern should be done between the hips and the knees.



Fig 1



Fig 2

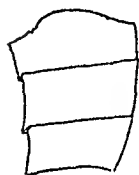


Fig 3

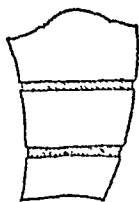


Fig 4

of the bodice, at the waist, and of the sleeve, above and below the elbow. If the pattern is too narrow, let in a piece in the centre of the shoulder seam, front and back, right down to

the hem. Fit the pattern again. To cut out, pin the pattern flat on the material and trace round it (i.e. tack) excluding the turnings. Mark all the snicks and perforations with tailor's tacks. Then cut out, allowing turnings. Tack the dress together over the traced lines, and fit. Where alteration is needed, pin, then retrace, and retack. Then fit again. Stitch all seams, and then press open with a hot iron and a damp cloth. Press open sleeve seams, and fit into the dress. Finish off neck and cuffs, and allow dress to hang for some time to allow material to drop. This is most essential for a skirt cut on the cross. The bottom may be finished by many methods (see **NEEDLEWORK**).

The method of lengthening and shortening patterns is shown in figs 3 and 4, and in figs 1 and 2.

Tacking A method of sewing materials together temporarily (see **BASTING**).

Piping A decoration used at a seam, consisting of a cord covered with the material cut on the cross. Piping is used a great deal on upholstered furniture. Sometimes it is just a contrasting bias strip let into a dress.

Dreyfus, Alfred (b 1859), French artillery captain, of Jewish parentage, was charged in 1894 with delivering documents to the German Government, and court-martialled. Evidence was scanty, but professional jealousy, coupled with strong anti-Semitic feeling, led to his condemnation to life imprisonment on Devil's Island. In 1896 Colonel Picquart, head of the Intelligence Department, became convinced that a Major Esterhazy was the culprit. Esterhazy (who afterwards fled to London and confessed that he was the culprit) was tried and acquitted, and Picquart was transferred to Tunis. Zola (qv) then protested Dreyfus's innocence in his famous open letter "*J'accuse*," of Jan. 1898. Picquart's successor, Colonel Henry, afterwards committed suicide, after confessing that he had forged

the commonest causes but it may be due to weakening of the walls of the capillaries or to obstruction of a vein by clotting. Various names are given to dropsy in particular regions of the body. *Edema* is a small dropsy of the superficial tissues, *anasarca* a larger one of the same region. *Hydropers cordium* is an accumulation of water in the membranous sac round the heart. *Hydrothorax* in the pleural cavities. *Hydrocephalus* in the brain cavities and *ascites* in the abdominal cavity. Purgatives diuretics and diaphoretics are given to reduce the amount of water in the body but in the more severe cases the only treatment can be by drawing off the fluid in a drainage tube.

Drouais, Jean Germain (1763-1788) French painter descended from a family of painters. He studied under David. He was later influenced by the work of Raphael and ancient art during a stay in Rome. His picture *Marius à l'infirmité* was highly praised by Goethe. Drouais father and grandfather were both well known. His father François Hubert (1727-76) represented in the National Gallery. Painted *Mme de Pompadour* *Mme du Barry* and *Marie Antoinette*. Drowning term applied to death by

the lungs. The signs of death by drowning are the presence of water in



Inspiration



Expiration

Artificial Respiration Selah Method

the stomach and mixed with air in the lungs a very pale face and a goose skin. A drowning person usually becomes insensible in one or two minutes and dies in about five minutes though people who have been submerged for a much longer period have been known to recover. An apparently drowned person should never be assumed to be dead. Artificial respiration should at once be tried. There are four methods of artificial respiration—the Hall the Sylvester the Howard and the Schafer. The Hall method consists merely of raising and lowering the patient from a position on his face to one on his side and vice versa 15 times a minute. In the Sylvester method the rescuer should kneel behind the patient's head grasp his arms by the elbow and raise them together till they extend in line with the body. He should then at once lower them to the side and press them firmly on the chest repeating the process 15 times a minute. In Howard's



Expiration



Inspiration

Artificial Respiration Sylvester Method.
Asphyxia caused by immersion in water some of which is inhaled into

bit rigidly attached to a piston, operated by compressed air, is used for breaking up roads. For very soft rock, rotating auger drills, usually driven by electricity, are frequently employed.

Drinking Cups may be made of almost any material. At various periods earthenware, gold, silver, wood, the horns of animals, crystal, glass, and leather have been used. In the Middle Ages they were often made with several handles to be passed from one to another when drinking pledges.

Drinkwater, John (b 1882), British dramatist and poet, first became known for his *Poems* (1908-14) and war plays, *Swords and Ploughshares*, etc. His most famous work, *Abraham Lincoln*, a play, was produced in 1919. Other historical dramas include *Oliver Cromwell* (1921), *Robert E. Lee* (1923), and *Mary Stuart*. He has written many plays, including *Bird in Hand* (1928), also critical studies of Wm Morris (1912), Swinburne (1913), and Byron (1925). Drinkwater published his *Collected Poems* in 1923. He helped to found the Pilgrim Players, now the Birmingham Repertory Theatre.

Droeshout, Martin (1601-51), English engraver. His father, Michael, and his brother, John, were also engravers. Droeshout's print of Shakespeare in the First Folio has made his name widely known. He was only 15 in the year of Shakespeare's death, so that it is highly improbable that it was drawn from life, and the general belief is that it was engraved from the painting now in the Memorial Gallery at Stratford-on-Avon. Droeshout's later works include portraits of Donne and Sir Thomas Overbury.

Drogheda, seaport of the Irish Free State on the Co. Louth border, lying on the R. Boyne. Cromwell took the town by storm in 1649. There are manufactures of linen, soap, flour, butter, and cotton, and agricultural products are shipped. Drogheda has ruins of a 12th cent. Dominican Priory and an Augustinian Abbey, and was once

the residence of the Irish Primate. Pop 13,000.

Drogheda, Statute of (or *Paymest Law*), took its name from the Lord Deputy of Ireland. It was passed in 1495, and finally repealed in 1782. Its leading points were that (1) no Irish Parliament could be held without the consent of the English sovereign, (2) no Bill could be introduced without his consent; (3) all statutes passed in England should be law in Ireland.

Droitwich, town, Worcestershire, 6 m N of Worcester, mainly noted for its mineral springs, which make it a popular health resort, and also yield the salt which is the main local product. Roman remains have been discovered, the springs are mentioned in Domesday Book, when they were Royal property. Pop 4,533.

Drôme, department situated in the S.E. of France, bordered by Vaucluse on the S, the Isère on the N, the Rhône on the W, and Hautes Alpes on the E. Agriculture is the main industry, wheat, grapes, mulberries, walnuts, and potatoes being produced. Cattle and sheep are raised, and silk production is important, great numbers of silkworms being raised. Minerals give rise to pottery and porcelain manufactures in some districts, and there are also flour-milling, boot making, and woollen industries. The capital is Valence, other notable towns are Romans, Montélimar, and Die. Area, 2,500 sq m, pop 267,000.

Dromedary, see CAMEL.

Drone, see BEES.

Drontheim, see TRONDHJEM.

Dropsy, an accumulation of serous fluid in the body cavities or tissues. Serum is normally exuded through the walls of the small blood-vessels, part of it being absorbed by the veins and lymphatic vessels and returned to the blood. Dropsy arises when the serum is not absorbed sufficiently or is exuded in abnormal quantities, and is therefore more a symptom of some other disturbance than a disease in itself. Diseases of the heart and kidneys are

age by 1* plus th age thus the dose
for a child aged 3 years is $\frac{3}{12+3}$ equal
to $\frac{1}{5}$ or one fifth the adult dose

Some people have a peculiar individual sensitivity to certain medicinal preparations which have a normal effect on others. Tolerance which may be natural or acquired is a phenomenon in which there is failure to react to certain drugs. Acquired tolerance is the result of drug-addiction e.g. to alcohol cocaine morphine nicotine. The grip of some drugs the victim becomes completely demoralised and will resort to any deception to obtain its desires. A cure may be achieved in a home or institution but sudden cessation of the accustomed dose may lead to nervous and physical breakdown. If the amount of alcohol in the system can be oxidised and destroyed it acts as a food. If not alcohol becomes a drug producing toxic effects. Certain drugs—opium cocaine Indian hemp morphine and heroin—are controlled entirely by the medical profession (see also PATENT MEDICINES).

Druidism, a religion which flourished among the Celtic peoples in ancient Britain and Gaul. It consisted in large part of tree worship and of sacrifices sometimes human. Especial stress is supposed to have been laid on the worship of oak trees and mistletoe was revered.

The Druids were the priestly class handing down the traditions of the religion from generation to generation. They were venerated as seers and acquired a reputation in the ancient world as philosophers. They taught that the soul was immortal and at a certain period after death entered life again in other bodies. They held an influential position in the life of the times acting as judges and their opinions were greatly respected.

Druids, Ancient Order of, a friendly society established in 1781 with a ritual supposed to be founded on that of the Druids of early Britain. There are similar societies in Germany and

the USA. See also FRIENDLY SOCIETIES.

Drum, see ORCHESTRA.

Drummond, Hon. Sir (James) Eric (b. 1876). First Secretary General to the League of Nations. After a career in the Foreign Office he became Private Secretary to the Earl of Oxford (then Viscount Asquith) in 1911. In 1919 he was appointed Secretary General to the League of Nations. He retired in 1933 and was appointed British Ambassador to Rome.

Drummond, Thomas (1797-1840). British inventor and civil servant. He entered the Royal Engineers in 1815 and in 1830 took part in an Ordnance survey of Great Britain. Hearing mention at one of Faraday's lectures of the luminosity of lime when incandescent he decided to try to utilise it to make distant objects visible at night in Belfast in 1835. He developed a limelight visible 67 m. This Drummond light in 1839 was adapted for use in lighthouses. He also improved upon the heliostat. He entered politics and in 1831 was made superintendent of the Irish boundary commission and in 1835 became Under Secretary for Ireland.

Drummond, Wm. of Hawthornden (1585-1619). Scots poet, a friend of Ben Jonson and Michael Drayton. His journal conveys much interesting information concerning them and contemporary literary figures. He wrote many poems of which his *Cypresse Grove* (1633) and sonnets are best and a *History of the Five Jameses* (1633).

Drunkenness, the state of being overcome by strong drink. In law it is an offence to be drunk and disorderly in a public place or knowingly to sell drink to a drunken person. See also CRIMINAL LAW, CONTRACT, DIPSONMANIA, MOTOR-CARS, LAW RELATING TO.

Drury, Alfred, contemporary British sculptor born in London, received his training at the Oxford School of Art, St. Kensington and later in Paris under Dalou. Drury is responsible for many recent public monuments including

method the patient should be turned face downwards and pulled over a rolled-up heap of clothing or similar object, which projects under his stomach. He is then turned over on to his back and the arms placed above the body. The operator kneels astride the hips of the patient and places both hands on the lower part of his chest, with the thumbs under the lowest ribs, he then presses forward, raising the ribs, and follows this by leaning slightly backwards, repeating the process 15 times a minute. This method is probably better than the Sylvester, but the Schafer is generally considered the best of all. In this the patient is laid on his face, the operator kneeling over him with his hands flat on the lower part of the back and splayed out. He then leans forward and back alternately 15 times a minute, spending longer over the forward movement than the backward. In all cases artificial respiration should be continued until the patient revives or a doctor pronounces life extinct. When the patient comes round, brandy or hot drinks should be given in sips, and warm clothing, blankets, and hot bottles should be applied.

Drugs, substances which modify the functions of the living body without supplying it with useful energy, though no sharp differentiation is always possible between drugs and foods, which yield energy. The term is used loosely by laymen to indicate narcotics.

Drugs may be administered as mixtures, tinctures, decoctions, infusions, extracts, liniments, ointments, lotions, injections, syrups, enemata, and lozenges. They may be applied to the skin, given by mouth or by rectum, injected under the skin, into a muscle or vein, or inhaled. Drugs applied externally may be *rubefacients*, irritants acting on the skin, where they relieve congestion and diminish pain, or *vesicants*, which cause fluid to exude from the tissues and to collect in blisters. Drugs given by mouth are usually absorbed from the upper

portion of the small intestine, the rate of absorption varying with the amount of food present. They then exert the specific action on the various tissues of the body, nerve-cells, blood-forming tissues, muscle, etc. Drugs are *excreted* by the kidney, bowel and sweat glands. Some, like arsenic, may be stored in a number of organs and tissues. Their *action* may be (a) physical, e.g. bismuth, by adhering to the mucous lining of the stomach, forming a valuable protective covering in inflammation of that organ, (b) by osmosis, attracting fluid and thus rendering the stools more watery and bulky, where, by peristalsis, the normal rhythmic movement of the intestine, is increased and constipation relieved, or (c) astringent, the drug combining with albumin in the tissues and forming the insoluble albuminate; e.g. tannic acid.

Drugs may be classified as hypnotics (bromides, chloral, luminal, paraldehyde), analgesics, which relieve pain (aspirin, opium, morphine), antipyretics, which reduce fever (aspirin), diuretics, which create the flow of urine (salines, urea, caffeine), cardiac (heart) tonics (digitalis, strophanthus, squill), bitters, which increase appetite and aid digestion (gentian, quassia), emetics, which produce vomiting (tartar emetic, ipecacuanha, apomorphine, mustard), animal extracts (dried thyroid, pituitary extract, insulin, for diabetes, and liver extract for modern treatment of pernicious anaemia), purgatives, which may be drastics or laxatives (salines, mercury, castor-oil, jalap, rhubarb, senna, cascara). A few drugs only are *specific* in their action, as iron in anaemia, quinine in malaria, mercury and arsenic in syphilis, thyroid in myxoedema.

The time at which a drug is administered is important. Hypnotics are given at a suitable interval before bed time, purgatives usually in the evening, and bitters just before meals. The dose of a drug is influenced by various factors, chiefly age. According to Young's rule, the dose for children under 12 is obtained by dividing the

a great success as were *The Medal* (1687) an attack on Lord Shaftesbury *Mac Flecknoe* (1688) an attack on Thomas Shadwell a rival poet and *Religio Laici* (1682) against Papists and Nonconformists. With the accession of James II (1685) Dryden became a Catholic writing *The Hind and the Panther* (1687) in defence of Catholicism.

With the Revolution (1688) he did not abandon his faith and thenceforth produced little but translations and occasional poems. Of these the *Ode on St Cecilia's Day* and *Alexander's Feast* are best known. His last work was *Fables* (1700) based on Chaucer and Boccaccio.

Dryden was equally famous as a

prose writer. His ability as a literary critic was clearly seen in *Essay of Dramatic Poesy* (1668) and his *Defence of it* against other critics (1668). He is even more important for his influence



J. Dryden

than his works for he swept away the obscurities and conceits of the metaphysical poets and set a standard of clear and expressive style that has lasted to the present time.

Dry-dock, a dock from which the water may be emptied to allow of convenient and expeditious ship-repairs. The most common form is the graving dock the mouth of which is sealed by a tight fitting caisson. Dry-docks measuring over 1000 x 100 ft exist at Balboa (Panama) Boston (U.S.A.) Liverpool Norfolk (U.S.A.) Philadelphia Quebec St John (New Brunswick) San Francisco and Victoria (British Columbia). Floating docks are also used for the same purpose the largest being at Malta Southampton and Singapore.

Dry farming a system of cultivation of land in dry areas where lack of water limits production of plants whereby the small rainfall is carefully conserved and utilised. The principle is to prepare a porous and powder d surface soil through which all the rainwater may readily pass to a subsoil whose water retaining powers have been increased. The land is ploughed and the subsoil made firm so that water may not pass far through the surface is finely pulverised and the seed then sown. The surface dries rapidly and this stops the capillary passage of water upwards from the soil to the atmosphere in dry seasons. Large areas in Canada and Australia are dry farmed under wheat.

Dry Ice (or *Dryhold*) commercial name for solidified carbon dioxide which is being employed to an increasing extent as a refrigerant. Weight for weight it has c. 15 times the cooling effect of ice and thus a much smaller amount need be transported in travelling refrigerator cars. It also has the advantage that its decomposition product is gaseous and thus the moisture attendant upon the use of ice is eliminated. See also CARBON DIOXIDE.

Drying Oils a class of fatty oil largely composed of highly unsaturated constituents with the result that when exposed in a thin layer to the air they absorb oxygen and undergo polymerisation with the formation of a flexible and tenacious film. For this reason they are much in demand for the manufacture of paints varnishes and other types of finishes as well as in the production of linoleum and the treatment of leather and textiles.

The principal drying oil of commerce is linseed (flaxseed) oil others of industrial importance being tung (China wood) perilla hempseed soya bean sunflower seed and safflower. All these are vegetable oils the principal drying fish oil being menhaden. The large majority of these oils (with the exception of tung) are seldom used alone in paints or var-

the colossal statues of Queen Victoria at Bradford and Portsmouth (1903), the decorations for the exterior of the War Office (1905), and of the Victoria and Albert Museum (1909), as well as for a number of war memorials. He became an RA in 1913.

Drury Lane Theatre, built by Thomas Killigrew (1612-1683) as the *Theatre Royal*, in Drury Lane, London. It was twice burned down, in 1672 and 1809. It was reopened in 1812, which occasion gave rise to the *Rejected Addresses* of Horace and James Smith (qv). It has for long been associated with the production of melodrama and sensationally spectacular shows. The stage was burnt in 1908.

Druses, the members of a religious body founded in the 11th cent. A.D. by Al-Hakim, Caliph of Egypt. A much-persecuted sect, they live in the mountainous districts of Syria. They have played a considerable part in the local politics of that region, being continually involved in the civil wars of the Turkish Empire. They struggled for independence against the Turks, obtaining it under weak Sultans, losing it under strong. In 1925 they rebelled against the policy of General Sarrail, the French Governor of Syria (held by France under a mandate from the League of Nations) in Syria, but were defeated in 1926. In religion the Druses are unitarians, believing in a God who has revealed Himself in various incarnations, by this belief separating themselves from orthodox Islam. Hakim was the last incarnation, and Hakim will return to conquer the world for the faithful. They look upon Jesus, but not Mohammed, as an incarnation of the Deity.

Dryads, in classical mythology, were wood-nymphs, the Hamadryads were the genus of particular trees, with whose decay they too faded and died.

Dryburgh Abbey, ruined 12th-cent. abbey on the Tweed, in Berwickshire, the burial-place of Sir Walter Scott.

Dry Cleaning, a method of cleansing house furnishings or clothes which are

unwashable on account of their fabric or the difficulty presented in pressing and ironing. Velvets, chuffs, materials which may lose their color in washing, and leather and pleated garments are cleaned by immersion in a liquid which loosens dirt by dissolving the surrounding grease. Petrol, benzol, and carbon tetrachloride are the solvents most frequently used. The first two are highly inflammable and should be used out of doors away from any flames. The last is non-inflammable, but more costly. The garment should be completely immersed in a tub of solvent, and agitated to clean exceptionally dirty parts, lay the garment on a table and brush the spots. Rinse in a fresh supply of solvent, squeeze, and hang up to dry out of doors. Iron when nearly free from smell. Strain the dirty solvent ready for the next cleaning.

A small machine will dry clean a home in a few minutes without soiling the hands, using a non-inflammable solvent in a closed container. The articles are placed in a revolving drum the handle turned for a few minutes and the cleaning is finished.

A more elaborate apparatus has spotting board, which may be dropped at the ends when not in use; an automatic device for filtering the flux while the cleaning is in process, and two swivelling hangers for holding garments.

Dryden, John (1631-1700), English poet and dramatist, demonstrated early his willingness to follow wherever the Court and popular tastes would lead him. Thus his first comedies including *Marriage à la Mode* (1673) display all, and more, of the then popularly demanded of the stage of the day. His early tragedies include *The Conquest of Granada* (1669-70) and *All for Love* (1678), a version of the story of Antony and Cleopatra. In 1667 he published *Annus Mirabilis*, and was made Poet Laureate in 1670. He then took up satire and in this genre quickly became supreme. *Absalom and Achitophel* (1681) a political satire, was

pop (excluding Dublin city) 188 961
 () (Irish *Bonn Aitha Clacha*) capital
 of the Irish Free State situated
 on Dublin Bay at the mouth of the
 R Liffey on the Irish Channel Dub
 lin is of great importance as a trading
 centre its docks accommodate large
 vessels and are highly efficient As
 the principal railway terminus for
 the whole country Dublin receives
 quantities of agricultural produce for

considerable length of water front
 with many quays and docks Public
 buildings include Dublin University
 (Trinity College) founded in th
 16th cent the National University
 the Bank of Ireland and the National
 Library and National Gallery of
 Ireland

Dublin is known to have existed as
 early as A.D. 491 and is said to have
 been Christianised by St Patrick in



St Patrick Cathedral Dublin

(C. H. L. V. S. R.)

export, and itself produces and exports
 poplin whisky beer and stout

The town grew up around the an
 cient castle which is on a low hill over
 looking the river Within its precincts
 are the two Protestant cathedrals
 Christ Church (11th cent) and St
 Patrick's (10th cent) both of con
 siderable architectural interest There
 is also a Roman Catholic Pro-Cathe
 dral in Marlborough Street During
 the second half of the 19th cent as
 the city grew in commercial importance
 it spread rapidly and now has a

the 5th cent It was frequently
 attacked and held by the Danes in the
 11th and 12th cents until they were
 finally expelled in 1171 In 1649
 Cromwell landed in Dublin after it had
 been taken by the Parliamentary forces

The city was considerably damaged
 during the Easter Rebellion of 1916
 and again in 19 Sackville (now
 O'Connell) Street was practically
 wrecked and the Customs House and
 the Four Courts severely damaged
 Since that time reconstruction on a wide
 scale has taken place Pop 419 900

nishes, but are blended with linseed oil See also OILS, FATS, AND WAXES

Dry-point, see ENGRAVING, ETCHING

Dry Rot, a name given to the fungus (*Merulius lacrymans*) which attacks wood in houses, owing to the dry appearance of the wood after decay. Actually the fungus requires continual damp in order that it may thrive. Wood in the open, though subject to damp, is not attacked by dry rot, since sunlight and frost are inimical to it. By means of strands (*hyphae*) the fungus spreads within wood, feeding upon it and forming felt-like sheets over its surface, or over brick, stone, or metal surfaces, and even through the mortar of walls in search of new wood. Dry rot which starts in a cellar may thus spread even across substances from which it receives no sustenance as far as the roof of a house. In suitable places the fungus pushes out so-called fruit bodies, sometimes called bracket fungi, which send millions of minute red spores into the air, which eventually settle and germinate in their turn.

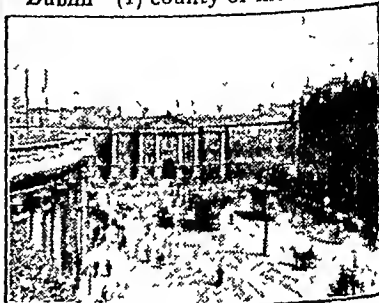
Cure If a house is built of properly seasoned timber and its ventilation is efficient, dry rot is not likely to appear. The only method of eradication is to cut out all the affected timber, which, in order that the infection may not spread to neighbouring houses, should be burnt. Surrounding brickwork should be sterilised with a blow lamp, and ventilators redesigned or cleared of all encumbrances. To guard against possible recurrence of the pest, all timber replaced should be treated with an antiseptic. Creosote is the best preventive, especially where it is possible to use timber which has been impregnated with creosote under pressure, but where creosote is impossible, preventives consisting of metallic salts may be used. For further information the pamphlet on Dry Rot, published by the Forest Products Research Laboratory at Princes Risborough, should be studied, or advice sought of the British Wood Preserving Association.

Du Barry, Jeanne Bécu, Comtesse

(c 1743-1793) mistress of Louis XV of France; formerly a Parisian milliner. With her lover, the Duc d'Aiguillon, she controlled the Royal policy, but on Louis' death in 1774, was compelled to retire to Luciennes. She was guillotined Dec 1793, during the Revolution.

Dublin, see BLACKING

Dublin (1) county of the Irish Free



Trinity College, Dublin

State on the E coast, bounded N and W by Meath and Kildare; S by Wick.



(Courtesy L. M. S. R.)
O'Connell Street, Dublin

low, and E by the Irish Sea. The S is mountainous, the chief peaks being Glendoo (1920 ft) and Two Rock (1700 ft). The rest is fairly low-lying, and mainly given over to pasturage and agriculture—oats and potatoes. There are coastal fisheries. Manufactures are confined to the city (qv). Area, 355 sq m,

well as *The Land of the Midnight Sun* (1831) and *The Land of the Long Night* (1900)

Duchesse, Louis Marie Olivier (1843-1900) French Catholic priest noted for his scientific and erudite studies in church history which brought him into opposition to the authorities a volume of his *Histoire de l'Eglise* being placed on the *Index* of prohibited books

Duck, general name for a family of universally distributed web-footed water-fowl related to the swans and geese. The name is however especially applicable to the common wild duck and its domesticated breeds. Strictly speaking the name is for the female

The common wild duck or mallard inhabits the N hemisphere from polar to tropical regions. It is resident in its country in marshy districts is monogamous and breeds on the ground or rarely in trees. The duck is mottled with brown but the drake is handsomely coloured in the breeding season. In May he moults his spring plumage and assumes the colour of the female.

Domesticated breeds vary comparatively slightly from the wild duck except that they are usually somewhat larger, white in colour and have been made polygamous. Aylesbury Rouen and Pekin ducks are the favourite breeds. A dark glossy green variety is known as the Blue or Ayles duck. Another peculiar breed is the Indian Runner duck, also called the penguin duck from its erect gait.

Duck Keeping. There is a growing demand for ducklings for the table and as ducks can find much food for themselves if allowed a free range begin to lay at 5 months and may be kept for egg production at least one season longer than hens. They are one of the most profitable forms of poultry. The Aylesbury is unequalled as a table duck but the King is a better layer where access to water for swimming cannot be given. It is not advisable for

best results young drakes should be mated with ducks from 18 months to 2½ years old and one drake may be mated with 3-5 ducks of large breed or 5-8 of smaller breeds. A pen is advisable for enclosing the ducks at night for easier collection of eggs which are laid in the early morning and for protection from enemies. Eggs are usually hatched under broody hens or may be incubated. Food is given to the ducklings after 36 hours. Fine flint grit covered with water and a moist food of middlings maize oat biscuit and meat meals and a little cod liver oil are given for 3 weeks the oatmeal and biscuit meal being then omitted the maize meal increased and Sussex ground oats added. Feeding should be regular 5 times a day for the first fortnight and then 3 times daily. Ducklings should not be allowed swimming water if not added for the table but enclosed after 5 weeks given as much food as they will eat 3 times a day and killed at 10 weeks.

Duckbill, semi aquatic mammal of the order

Monotremata is found in Australia and Tasmania.

It takes its name from the resemblance of its



Duckbill.

beak. It lives in rivers burrowing in the banks and feeds on water worms insects and snails. It is of great scientific interest from being in some respects a link between the higher Mammals and the Reptiles a remarkable peculiarity being the hatching of its young from eggs laid in the burrow. The Duckbill also known as the Platypus is about 18 in long and has broad webbed feet and thick water proof fur. Destruction of the animal by the fur trade has greatly reduced its numbers but it is now strictly protected.

Duckling and Cuckling Stools, chairs used in connection with certain punish

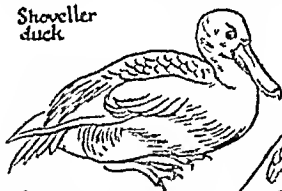
Dublin Fusiliers, Royal, formed of the 102nd and 103rd foot, and disbanded on July 31, 1922, on the establishment of the Irish Free State. The regiment served many times in India, and in the South African War joined in the relief of Ladysmith. In the World War, 11 battalions were raised, and fought in the Retreat from Mons and on the Marne (1914), at Ypres (1915, 1917, 1918), on the Somme (1916), at Cambrai (1917, 1918), and in Macedonia, Gallipoli, and Palestine. Its badges are the Royal Tiger and the Elephant, with the motto *Spectamus Agenelo*.

Dubrovnik (*Ragusa*), seaport town in Dalmatia, Yugoslavia, on the Adriatic. The town is surrounded by ancient walls, strengthened with forts, and has an early Byzantine church and two 14th-cent convents. The Palace of the Rector (*i.e.* chief magistrate), built 1388-1435, has a striking façade. Dubrovnik was a former trading centre as well as the centre of a school of Serbian literature. Pop 13,300.

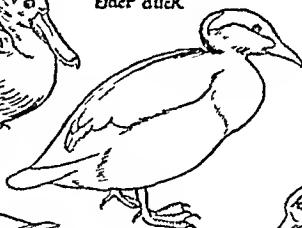
Ducat, a coin, usually of gold, in use at various times in different European countries. The first ducat was struck by Roger II of Sicily. It took its name from the Latin word *ducatus* which occurred in a pious dedicatory phrase inscribed on it. A 13th cent. Venetian gold coin was first known as a ducat, and this remained the unit of account, though the coin itself later took the name of sequin. Ducats were also used in Austria, Spain, the Netherlands, and Denmark, and most recently in Hanover under George I and III of England.

Du Chaillu, Paul Belloni (1835-1903), French anthropologist (naturalised American), first travelled with his father on his trading journeys in W Africa. His two great expeditions into W Africa (1855-9 and 1863-5) were described in his articles to the American press, and in *Explorations and Adventures in Equatorial Africa* (1861) and *A Journey to Ashangoland* (1867). Of his other works, adventure-stories form an important division, as

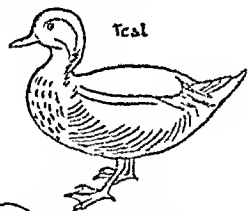
Shoveller duck



Eider duck



Teal



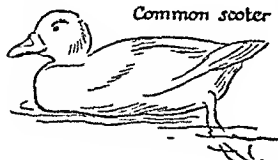
Scaup



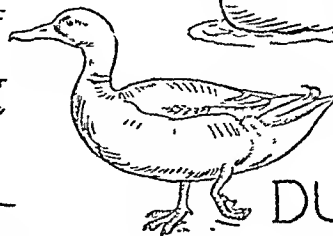
Widgeon



Common scoter



Mallard



DUCKS

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Ducking and Cucking Stools, chairs used in connection with certain punish

ments in the past. The cucking stool is especially connected with the punishment of dishonest tradesmen. The occupant was tied to it with bare head and feet, and exposed at his door or drawn through the streets. The ducking stool was used for the punishment of harlots, scolds, and supposed witches. It comprised a seat at the end of a long pole, acting as a lever, the release of which plunged the victim into a pond.

Duckweed, a minute floating plant, often so abundant as to cover the surface of stagnant water, where, with the insects it harbours, it is greedily devoured by ducks. The leaves of the commonest species are egg-shaped, and each bear a single root. Reproduction is almost entirely vegetative, by separation of new fronds, but occasionally on the edge of the leaves 1-2 stamens and 1-4 seeded ovaries, enclosed in small sheaths, are produced.

Dudley, manufacturing town in N Worcestershire, 10 m NW of Birmingham, stands in a district of valuable coal and iron deposits, and its industries include coal-mining, iron- and brass-founding, engineering and glass-making. There are interesting fossils in the neighbourhood, and the remains of a 13th cent castle built on the site of a previous castle said to date from the 8th cent. Dudley is connected with Birmingham by canal. Pop 59,579.

Duel, a combat arranged between two persons, usually with swords or pistols, to decide a question outside the scope of the law, such as an insult to personal honour. In classical times and earlier, a duel between opposing leaders or champions often took the place of a full battle between armies, e.g. between David and Goliath, and Hector and Achilles. The "wager of battle" was once a form of legal decision by duel in Germany which, with the age of chivalry, developed into private combats on points of honour. The modern form of duelling dates from the 16th cent, and was extensively practised by the French

aristocracy from 1550 onwards. Strong measures, including confiscation of all property and even beheading, were taken against it by Richelieu. One of the most famous English duels, described by Thackeray in *Henry Esmond*, was fought between the Duke of Hamilton and Lord Mohun. A great revival of duelling was witnessed in German military circles under the Imperial régime, and though quarrels were first submitted to a court of honour, any officer refusing to fight on being challenged was expected to leave the regiment. Student duels or *Mensuren*, common before the War, continued to be fought though forbidden by law, and were legalised again in 1933. Duels are also fought secretly in France and openly in S America. In England a challenge is a breach of the peace, and a killing is regarded as murder. In a duel, each participant has a "second" to make arrangements and to represent the principals. The challenged party has the choice of weapons.

Dufferin and Ava, Frederick Temple Hamilton-Temple Blackwood, Marquess of (1826-1902), British diplomat. He was appointed British commissioner in Syria, 1860. He was Under-Secretary for India, 1864-6, for War, 1866, and was created baron (Clandeboyne) in 1850 and earl, 1871. As Governor-General of Canada, 1872-8, he consolidated the newly-federated provinces. He was later Ambassador at St Petersburg, Constantinople, Rome, and Paris. From 1884 to 1888 he was Viceroy of India and on his retirement was created Marquess. His fourth son, Frederick, succeeded his elder brother as 3rd marquess to the title in 1918, he was Speaker of the N Ireland Senate, and was killed in an air-crash, 1930, his son, Basil (b 1909) is the present marquess.

Dugdale, Sir Wm. (1605-1686), English antiquary and Garter King-of-Arms. He was a Royalist, and accompanied Charles I to Oxford during the Civil War. At the Restoration he was appointed King-of-Arms and knighted.

His works include *Monasticon Angli-
canum* (1650-73) *Antiquities of War-
wickshire* (16 8) *Baronage of England*
(1615-6) and other historical works.

Dugong a marine mammal of the
order *Sirenia* (q v) found in the Indian
Ocean from E Africa to W Australia.
It never comes to land and subsists on
seaweed near the coast. The Indian
species is c 8 ft long but a larger kind
is found off the coast of Australia
where dugong fishing was formerly
a flourishing industry but where the
animal has now become scarce. The
oil yielded is sometimes substituted
for cod liver oil.

Dug-out, a military underground
shelter usually found in conjunction
with trench works and used for pro-
tection against enemy fire. Trench
warfare between 1914 and 1918 made
dug-outs the normal living places of
men in action, and many were well
constructed and equipped. One of
the chief objections to dug-outs is the
unreadiness of their inhabitants to
repel sudden attacks.

Du Guesclin (pron DO GESKLANO)
Bertrand (fl 14th cent) Constable of
France 1369-80. Fought in French
feudal campaigns and against the
English invaders 1356-64. After being
captured (1364) by Sir John Chandos he
was ransomed and led French mercen-
ary forces into Spain. There he fought
for Henry of Trastámara against Pedro
the Cruel and was defeated by the
Black Prince the latter ally 1367.
Recalled by Charles V he was made
Constable and from 1369 till his
death was engaged in recovering
the S and W of France from the
English and suppressing revolts in
Brittany and Languedoc.

Dukker meaning ducker or diver is
the name of a large group of African
antelopes distinguished by the linear
arrangement of the pores of the facial
gland. The forehead is usually tufted
between the horns which are short and
smooth. Many species are known
varying in size from a fox to a sheep
and the is derived from their
habit under cover when

alarmed. In S Africa the cormorant
is also called duiker by the Dutch
settlers. See also ANTELOPE.

Duisburg German river port at the
junction of the Ruhr and Rhine 15 m
N of Düsseldorf. The exports include
coal metal goods chemicals plat-
glass textiles and sugar. Duisburg is
a large manufacturing centre and has
notable technical schools. Pop
(with its suburb Harbourn) 441 200.

Duke, highest hereditary rank in the
British peerage. It was a European
title before its introduction into Eng-
land in the 14th cent. many continental
dukes and archdukes held virtually
royal positions. In England dukes take
precedence of all except princes and
princesses of the blood royal the Arch-
bishops of Canterbury and York and
the Lord Chancellor. A duke's eldest
son takes by courtesy his father's second
title which is usually of the rank of
marquess. Younger sons and daughters
take courtesy titles of Lord and
Lady before their Christian names.

Dukeries district including part of
Sherwood Forest in Nottinghamshire
and so called from the number of great
houses in the district which includes
Clumber House (Duke of Newcastle)
Worksop Manor (formerly Duke of
Norfolk) Welbeck Abbey (Duke of
Portland) and Thoresby House
(formerly Duke of Kingston).

Dukhobors, see DOUKHOBORS.

Dulcimer an obsolete musical instru-
ment consisting of a resonance-board
over which wires are stretched these
strings being struck by hammers held
by the performer. The modern piano-
forte probably had its origin in the
dulcimer.

Dulse, edible seaweed with leathery
purple leaves found on rocky coasts.

Duluth, city in Minnesota U.S.A. at
the extreme W end of Lake Superior.
It is a great port handling all the com-
merce of the Great Lakes. There is a
trade in iron ore wheat dairy produce
and coal and local industries include
steel and flour mills. Pop 101 500.

Dulwich, district in the borough of
Camberwell S.E. London.

College, a well-known public school, was founded by Edward Alleyn in 1619. There is a picture gallery comprising mainly the bequest of Sir P. F. Bourgeois in 1811.

Duma [*pron* dōōmah], the lower House of the Russian Imperial Parliament, created in 1905 by the Constitution granted by Tsar Nicholas II, and replaced in 1917 by the Soviet system. Without any parliamentary experience or tradition, the Duma found itself in continual opposition to the Imperial régime, and unable to effect any important legislation. The first Duma lasted only 2 months, the second 3, and the third 5 years. The form of election was direct in the great cities, elsewhere through electoral colleges, but heavily weighted everywhere in favour of the property-owning classes.

Dumas, Alexandre, père (1803-1870), French author, produced a prodigious number of plays, poems, and novels, but he is known to-day chiefly for his *Three Musketeers* (1844), and its sequels, *Twenty Years After* (1845), and *The Vicomte de Bragelonne* (1848-50). Of his other novels, *The Count of Monte Cristo* (1845) and the *Black Tulip* (1850) are most popular. These are remarkable for their characterisation, dialogue, plot, and for the immense gusto with which Dumas always wrote. His son, **ALEXANDRE DUMAS, fils** (1824-1895), French dramatist, wrote *La Dame aux Camélias* (published as a novel, 1848, and dramatised, 1852). Other plays are *Diane de Lys* (1853), *La Question d'Argent* (1857), and *Une Visite de Noce* (1871). They show a complete contrast with his father's works in nature and style.

Dumas, Jean Baptiste André (1800-1884), French chemist, studied at Geneva under Prévost, and became a famous lecturer in Paris (c 1825). Here he determined many atomic weights, discovered the law of substitution, and did much work on vapour densities, amyl alcohol, etc., which greatly influenced chemical developments. In later life he entered politics

and held important posts in the Government until the collapse of the Second Empire.

Du Maurier, George Louis Palmella Busson (1834-1896), British black-and-white artist and novelist. The son of a naturalised Englishman with an English wife, he was born in Paris, and spent most of his time in France until he entered University College, London, in 1851, where he studied chemistry. Five years later he was back in Paris, having abandoned chemistry for art. He returned to London in 1860, and began the contributions to *Punch* which won him so much fame. His drawings of women, as obviously well-bred as they were pretty, but astonishingly tall, his perfect gentlemen and "mashers," with their side-whiskers and their striped trousers, the general "good society" flavour of his work gained him enormous popularity. In his later years he produced 3 novels: *Peter Ibbetson*, *Trilby* (1894), and the *Marthan*, of which the first two at least became nearly as popular as his drawings. Sir Gerald du Maurier (b 1873), the actor-manager, is his younger son. "Trilby" became the name of a man's soft felt hat, as shown in Du Maurier's illustrations, and as worn in the play founded on the book.

Dum-Dum, town in Bengal, British India, 5 m. from Calcutta, for many years the headquarters of the Bengal Artillery. It was in the ammunition factory here that the expanding "dum-dum" bullet was first produced. Pop 22,000.

Dumfries, capital of Dumfriesshire, Scotland, situated on the R. Nith, was the last residence of Robert Burns, whose mausoleum stands in St. Michael's Church. Manufactures include tweed, hosiery, timber, engineering, and foodstuffs, and there are important cattle and horse markets. Just outside Dumfries is Lincluden Abbey, dating from the 12th cent. Pop 23,000.

Dumfriesshire, a S. county of Scotland, bounded S. by the English border, and Solway Firth, W. by Kirk-





MOUNT EVEREST, FROM DARJEELING

the bright E. by Roxburgh and N. by Lanark. From hills in the N. the Nith, Annan and Lak Rs. flow S. and form the well known dales of those names. The county is mainly agricultural producing sheep, cattle and horses. Manufactures are largely local and unimportant but include distilling, tanning and a little wool and hosiery. Lead is ruined and there are sandstone and limes one quarries. The rivers afford valuable salmon fishing. Some interesting Roman remains exist and there are cairns, stones and other relics of early habitation. Robert Burns's farm was in Nithsdale and Thomas Carlyle's house is still preserved at Ecclefechan. Area 1063 sq. m. pop. 81,000. The principal towns are Dumfries, Annan, Thornhill and Moffat.

Dumping the disposing of goods on the market at unfairly low prices. The disposal of surplus stock regardless of cost sale below cost in order to ruin a competitor or uneconomic production in order to keep machinery at work, are some examples of dumping. The word is chiefly applied to-day in the field of foreign trade and has been used to designate for example the export of E. European and Asiatic goods produced with the advantage of low wage costs, the export of German and other goods during periods of inflation and the export of Russian goods at any price in order to raise foreign credit.

Dunajetz, a river in the Carpathians in whose neighbourhood much fighting took place between the Russians and the Central Powers in May 1916. German reinforcements were brought up to assist the Austrians who were on the point of collapsing under the Russian attacks. The first stage of the offensive resulted in the driving back of the Russians from the R. Dunajetz. They tried to hold the R. San (qv) but later in June were driven back from there to Lemberg (Lwow). See **LEMBERG BATTLE OF**.

Duna, see **DUNA**.

Dunbar town in E. Lothian, Scotland on the N. Sea coast, a favourite

holiday centre owing to its natural attractions and low rainfall. There are ruins of the castle which was several times attacked and taken by Edward I, the Duke of Albany (1479) and Mary, Queen of Scots are both known to have sheltered there. Pop. 4000.

Dunbar Battle of (1) (Apr. 7, 196) Edward I of England defeated by the Scots under John Balliol (qv) (2) (English Civil War) (Sept. 3, 1650) the Parliamentarians under Cromwell routed the Scottish Royalists under David Leslie.

Dunbar, William (c. 1465-c. 1500) Scottish poet attached to the Court of James IV. His chief works are the alliterative poems *The Golden Tug* and *The Thistle and the Rose* celebrating the marriage of James IV and the famous *Lament for the Makaris*. *The Ballad of Kynd Killych* is a good example of his Scottish humour and *The Dance of the Seven Deiddis Synnis* of his satire.

Duncan, Kings of Scotland

DUNCAN I (d. 1040) succeeded Malcolm II c. 1034, suffered defeat by the Danes and was slain by Macbeth who seized the throne.

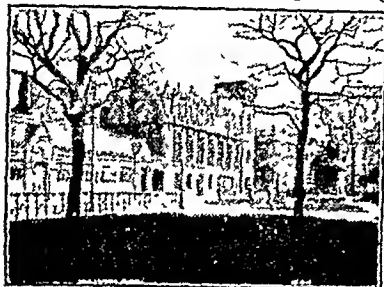
DUNCAN II (d. 1094) grandson of Duncan I gained the throne by expelling his uncle Donald Ban (1093) though the latter defeated and slew him shortly afterwards.

Duncansbay Head, cape on the extreme N.E. of Scotland in Caithness. John O'Groats house is c. 1½ m. distant. **Dundalk**, port of co. Louth, Irish Free State stands on the bay of that name. Dundalk is a considerable manufacturing town, its industries including locomotive works, flax and jute mills and breweries. There are valuable fisheries and the port trades in agricultural commodities. Edward Bruce was crowned King of Ireland here in 1317. Pop. 12,000.

Dundas, Henry 1st Viscount Melville (1749-1811) British politician. M.P. 1774-1800 was appointed Solicitor-General for Scotland 1768. As Lord Advocate 1795 he was virtual ruler of Scotland. He opposed the

granting of any concession to the American colonists. He was Home Secretary under Pitt, Secretary for War, 1794-1801, Treasurer of the Navy, 1782-1800, and First Lord of the Admiralty, 1804-5. In 1806 he was impeached on a charge of malversation, and though acquitted, retired from public life.

Dundee, town in Angus (Forfarshire), on the N shore of the Firth of Tay. Dundee is a great port and manufacturing centre, its main products are jute, canvas, and linen, other industries include shipbuilding,



[Courtesy L. M. S. R.]
Dundee Royal Exchange

engineering, preserves (especially marmalade), dyeing, brewing, etc. Among the public buildings are the Caird Hall, the Albert Institute, and Parish Churches, three churches under one roof. Caird Park (10 m away) contains the ruined Claverhouse Castle. The University College, founded in 1880, and attached to St Andrews University, specialises in medicine and science.

Dundee is believed to have been the site of a Pict settlement, and was known to the Romans, it was held by English troops in 1291 and in 1385, and was a centre for the spread of the Reformed doctrines in the 16th cent. It returns 2 members to Parliament. Pop 175,583.

Dundee, John Graham of Claverhouse, Viscount (c 1649-1689), Scottish soldier. After serving under William of Orange, Dundee returned to Scot-

land, where he was engaged in suppressing the Covenanters in the S and SW. When James II was deposed in 1688 he still supported the hopeless Stuart cause, and fell at Killiecrankie, where his Highlanders gained a complete victory over General Mackay's forces.

DunDonald, Douglas Mackinnon Cochrane, 12th Earl of (b 1852), British soldier, served in the Egyptian campaigns, the S African War, when he led the 2nd Cavalry Brigade, and the World War. From 1902 to 1904 he commanded the British forces in Canada. He rode across the desert in Egypt with dispatches announcing the death of Gordon and loss of Khartoum. In South Africa he relieved Ladysmith.

Dunedin, town of South Island, New Zealand, capital of the Otago district. Dunedin is beautifully situated among forest-clad hills at the head of Otago harbour on the SE coast. Gold is obtained by dredging, and other exports are frozen meat, dairy produce, and wool. The town was named after Edinburgh (of which Dunedin is the Celtic name), by the original Scottish settlers. Pop 87,400.

Dunfermline, burgh in Fifeshire, Scotland, just N of the Firth of Forth. Its abbey has been the burial-place of many Scottish kings and queens. It was the birthplace of Andrew Carnegie, who endowed it richly. Manufactures include linen, damask, metal-founding, bleaching and dyeing, and engineering. Pop 34,954.

Dungarpur, Indian State in the S of Rajputana, under British protection, much of Dungarpur is hilly, and agriculture is the staple industry. The capital bears the same name. Area 1450 sq m, pop. State, 100,000, town 8000.

Dungeness, promontory on the Kent coast, S of New Romney, largely composed of shingle, it forms the most notable seaward boundary of Romney Marshes.

Dungeon, underground prison in the *Danjon*, or keep, of a Norman castle.

The word is also occasionally used as an alternative to donjon

Dunkeld, small town Perthshire Scotland on the R Tay On the site of a 9th cent Culdee church are the remains of 15th-cent cathedral Gavin Douglas translator of the *Aeneid* was its bishop (1516-20) Dunkeld is in some favour as a tourist centre Pop 1000

Dunkirk (*Dunkerque*) port in N France in the Nord department It is the third port of the country and handles a large commercial traffic Its harbour and quays are of great size and there are 4 dry docks the largest vessels can be accommodated The main exports which come by numerous canals from the N and E of France and from Belgium include coal and cereals sugar iron and steel goods and wool imports are jute wool timber cotton and chemicals Local industries include spinning engineering shipbuilding flour milling and metal founding During the World War Dunkirk was an important Allied base and suffered much damage Pop 33 000

Dunmow town in Essex on the R Chelmer Two m distant is Little Dunmow former home of the ancient custom of presenting a fitch of bacon (the Dunmow Fitch) to the couple who can prove that they have spent the first year of their married life in the most complete accord Pop (rural district) 15 566

Dunois [dʊnwaɪ] Jean, Comte de (*The Bastard of Orléans*) (c 1403-1468) French soldier natural son of Louis Duke of Orléans Defeated the English at Montargis 1427 and held Orleans till the arrival of Joan of Arc 1419 Shared victory with her at Patay and drove the English from Paris N France and Guéenne 1436-51 He joined the revolt against Louis XI in 1461 but was later reconciled to him

Dunoon, town Argyllshire Scotland on the W shore of the Firth of Clyde Dunoon is a well known holiday resort with a beautiful natural site and a temperate climate The ruins of

Dunoon castle stand above the town Pop 13 500

Dunsany Edward John Moreton Drax Plunkett, 18th Baron (b 1878) Irish dramatist author of dreamlike and melodramatic plays These include *The Glittering Gale* (1909) *The Gods of the Mountain* (1911) *A Night at an Inn* (1916) and *If* (1921) He has also written short stories in a similar vein

Duns Scotus, John (c 1265-1308) Franciscan friar and scholastic philosopher probably of Irish birth lectured in Oxford Paris and Cologne He was an opponent of the followers of Thomas Aquinas and an anti-rationalist His wit earned him the title of Doctor Subtilis His works include biblical and philosophical commentaries and his name is said to have been the origin of the word dunce

Dunstable market town on the N of the Chilterns in Bedfordshire some 40 m NW of London Local industries include engineering stationery metal founding and brewing Henry I founded a priory here of which a part is included in the modern church and the foundation of a palace of the same date can be traced Cranmer annulled Catherine of Aragon's marriage at Dunstable in 1533 Pop 9000

Dunstan, St. (c 920-988) English saint and archbishop Born near Glastonbury he became a monk after having served King Æthelstan and became Abbot of Glastonbury c 944 He was made Bishop of Worcester 957 of London 959 and Archbishop of Canterbury in 961 His main work was as political adviser to successive kings of Wessex particularly Edmund As Abbot of Glastonbury he did much for the revival of monasticism During the reign of Edred Dunstan was virtually ruler of the kingdom when he reorganised the administration

Dunster small Somersetshire town 2 m SE of Minehead of very ancient foundation the site of ancient British Saxon and Roman settlements At one time there was a considerable

trade in agricultural produce, but the silting of the harbour caused its decline. Parts of a 13th-cent castle still exist. Pop c 700

Dunwich, E Suffolk coast village, near Southwold, has suffered for centuries from constant inroads of the sea, but in the 7th cent it was a large trading centre, an episcopal see, and capital of East Anglia. The whole of the ancient town has been swallowed up in the sea. Pop 180

Duodenum, see BOWELS

Dupleix [DÜPLÂKS], Joseph François (1697-1763), Governor-General of French India, 1742. Endeavouring to secure the ascendancy of France over India, he besieged Fort St David, 1747, and strove to subdue the whole of S India. His designs were frustrated by Clive (q.v.), and he was recalled to France, 1754. His services were unrecognised, and he died in poverty.

Dupplin Moor, Battle of, Balaclava Rising (Aug 12, 1332). Edward Balliol and the Scottish barons defeated a numerically superior force of King David of Scotland under the Earl of Mar. Here was evolved the method of warfare which was later adopted for small forces against superior numbers, that of forming a "square" of spears, with archers on either side. This formation was frequently used against the French in the Hundred Years' War.

Duralumin, an alloy of aluminium, copper, and magnesium, with traces of other metals. The composition of a typical sample of duralumin is

Aluminium	94.4 per cent
Copper	4.5 per cent
Magnesium	0.95 per cent
Manganese	0.76 per cent

Duralumin, if properly tempered, has an extremely high tensile strength, and is widely used in aircraft construction. See also ALLOYS, ALUMINIUM

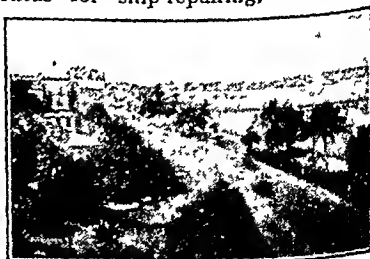
Durand, Sir (Henry) Mortimer (1850-1924), British diplomat; was Foreign Secretary to the Indian Government 1884-94, acting as Envoy to Afghanistan in 1893. He then became Minister at Teheran, 1894-1900, Consul-General

at Madrid, 1900-3, and from 1903 to 1906 was British Ambassador at Washington.

Durango, Mexican State, bounded W by Sinaloa, and N by Chihuahua. It has valuable deposits of iron (Cerro del Mercado is a hill largely composed of iron-ore), silver, coal, gold, and copper. The Sierra Madre is the principal mountain range, there are no rivers of note. Some agriculture is carried on, especially where there is irrigation. Chief towns are Durango, the capital, a notable commercial centre, El Oro, and Guanacavi. Area, 42,250 sq m., pop 395,000.

Durazzo, port in Albania, situated on Durazzo Bay, Adriatic coast. The town, once of considerable importance, has declined, partly owing to the sand-bar that blocks the harbour, agricultural produce and olive-oil are still exported. Durazzo was founded in the 7th cent B.C., and taken by the Romans in the 3rd cent B.C., was destroyed by an earthquake in the 13th cent. It was under Turkish rule from 1501 to 1913. Pop 10,000.

Durban, seaport of Natal, S Africa, situated just N of latitude 30° S. It handles all the produce of Natal. The natural harbour has been greatly improved, and possesses modern apparatus for ship-repairing, bunkering,



Lsplanade, Durban

grain-loading and storage. Exports include coal, maize, sugar, and wool. There is also a considerable passenger traffic. Public buildings of note are the Town Hall, public library and art gallery, and municipal offices. It was

named after Sir Benjamin D Urban a Governor of the Cape 1842-47 Pop (European) 88 28

Dürer [pron DEWRAIR] Albrecht (1471-15 8) German artist painter draughtsman and engraver the son



Albrecht Dürer

of a gold smith in Nuremberg where most of his life was spent In 1486 when he was apprenticed to the painter Wolgemut he had already produced a number of beautiful drawings and silver points including the well known portrait of himself at the age of 13 which shows astonishing skill and feeling for form In 1490 he set off on 4 years of travel through Germany during which he worked at Colmar where Martin Schongauer had just died at Basle and at Strasbourg On his return home he married Agnes Frey A few months later he visited Italy for the first time From 1493 he lived for 10 years in Nuremberg painting portraits and religious subjects and engraving on wood and copper The influence of his Italian travels is evident in his work at this period though it remains always essentially German in spirit and retains many of the characteristics of Schongauer and the other early German masters The complicated and beautifully drawn draperies are German but the nude drawings reveal Dürer's study of the Italians The wonderful landscapes in his engravings with their sense of structure and form and distance are one of Dürer's most notable individual contributions to the development of art

From 1505 to 1507 he lived in Venice where he painted *The Feast of St Rose* *Garlands* *the Virgin and Child with the Goldfinch* *Christ disputing with the Doctors*

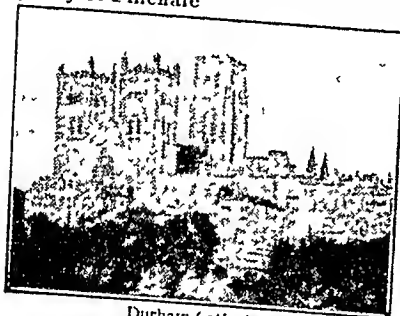
and a number of portraits Returning home he again settled at Nuremberg where he was widely honoured and admired and began work on some of his best known paintings including the *Adam and Eve* (1507) now at Madrid and *The Massacre of the Ten Thousand Martyrs* (1508) and *The Adoration of the Trinity* by all the *Saints* (1511) at Vienna He never ceased producing his drawings wood cuts and engravings The most famous of these are *The Knight and Death* (1513) *Melancholia* (1514) and *St Jerome in his Study* (1514) In 1511 Dürer produced a large number of drawings and prints and was engaged on the studies of anatomy perspective and proportion which had already fascinated him in earlier days Though he did not paint many more pictures he produced what are generally considered his two masterpieces the *St John with St Peter and St Paul with St Mark* (1516) which are now at Munich They have been classed as two of the finest paintings in the whole history of German art

Apart from his paintings and the magnificent collection of drawings and prints many of which are in the British Museum Dürer wrote a number of theoretical works on geometry and perspective on human proportion and on fortification He appears to have had the same passion for knowledge if not the same scientific genius as Leonardo and like Leonardo's the record of his researches is contained in his drawings and pictorial notes If Dürer's paintings do not perhaps equal the greatest works of the Italian masters his engravings and etchings show a mastery of drawing which has never been surpassed and has been a source of inspiration not unmixed with despair to generations of students since his day

Duress (law) unlawful constraint compulsion whether physical or by the use of threats A contract made under duress is voidable

Durham, county town of Durham county on the R Wear is not a great

manufacturing town, though iron goods and carpets are produced, and there is coal-mining in the locality, but is exceptionally rich in historical associations. The 11th-cent cathedral contains the tombs of Bede and St Cuthbert, and the castle, one of the most notable examples of mediaeval fortification, the remaining portions of which are used by the University, was begun in 995. One of the several bridges that cross the river was constructed in the 12th, and rebuilt in the 15th cent, and 3 m NNE of the city stand the ruins of the 12th-cent priory of Finchale.



Durham Cathedral

The University was founded in the city in 1831. It has now over 1200 students. Pop 16,223.

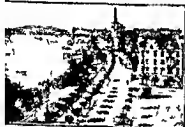
The COUNTY OF DURHAM is bounded N by Northumberland, W by Cumberland and Westmorland, S by Yorkshire, and E by the North Sea. The western part of the county includes part of the Pennine Chain, with its bare moors, the E is fertile and well-wooded. The coal-mines are among the most important in England. Other minerals include, slate, limestone, marble, lead, and zinc. The chief rivers are the Tyne (on Northumberland border), the Tees (on Yorkshire border), and the Wear. Shipbuilding is the most important industry. The principal towns are Durham (co-town), Sunderland, South Shields, Stockton, Darlington, Gateshead, the Hartlepool, and Jarrow. Area, 1015 sq m, pop 1,486,200.

Durham, John George Lambton, 1st Earl of (1792-1810), English statesman, Ambassador to Russia, 1835-7. Governor-General of Canada in 1837 where his conciliatory methods met with the disapproval of his colleague at home. On his return he laid before Parliament his *Report on the Affairs of British North America*, advocating local autonomy, which laid down the principles which have since become the basis of British imperial policy. His proposal for the union of Upper and Lower Canada was adopted shortly before his death.

Durham, University of, founded in 1831, was granted its charter in 1837. Since 1908 it has been divided into two parts, at Durham and Newcastle respectively. The Durham section is largely theological, and is governed by the Dean and Chapter of Durham Cathedral. It consists of University College and 3 halls of residence, as well as St Mary's College, which is a hostel for women, who have, since 1895, been admitted to all degrees except the theological. It includes faculties of arts, letters, theology, and law, and residence is necessary for a degree. In the Newcastle division, however, residence is not essential. This includes Armstrong College, founded in 1874 as Durham University College, and the College of Medicine, founded in 1832 and affiliated in 1852. The faculties of science and commerce are at Armstrong College, which also grants diplomas in agriculture, engineering, naval architecture, and mining, as well as instruction in forestry and marine biology, for which there is a station at Cullercoats.

Duse, Eleonora [doo-sā] (1859-1924), Italian actress. She first visited USA and London in 1893. She was associated with Gabriele D'Annunzio from 1897 till 1902 in an endeavour to revive classicism on the Italian stage. She retired in 1909, but returned to the stage in 1921. Her great parts included *Juliet*, *Francesca da Rimini*, *Marguerite*, *Magda*, and *Paula Tanqueray*.

Düsseldorf, German industrial city in Rhineland on the R Rhine. It is N of Cologne lies in a great coal and iron area and its leading industries are engineering metal founding and chemicals. Smaller manufactures are paper weaving furniture and piano-making and brewing. There are extensive riverside docks and the town is a notable railway centre. The public buildings include a valuable picture gallery a 13th-cent church and a famous Academy of Art. Düsseldorf fell to the French during the Napoleonic Wars and was occu-



View of the Rhine Düsseldorf.

ed by them after the World War 1918-19. Pop 478 300

Dutch East India Company a chartered company formed in 1595 and granted a monopoly of trade in the Pacific and Indian Oceans in 1602. It had power to make treaties build forts and employ troops and was in fact an important colonising agency in the same way as the English East India Company. Its chief bases were Java and Batavia (Batavia founded 1619) but it also had centres in Ceylon Borneo and S Africa. It was dissolved in 1795 and its territories taken over by the Dutch Government.

Dutch East Indies, term for the Dutch possessions in the Malay Archipelago consisting of the islands of Sumatra Java Madura Celebes Sumbawa Biliton the Riau Langkat archipelago the Lesser Sunda Islands the Molucca Archipelago and parts of Borneo and New Guinea. (qq v). In 1931 the pop was c 60 340 000 of

which c 208 000 were Europeans chiefly Dutch and a million foreign Asiatics Indians Arabs and Chinese the rest being natives. From 1602 to 1708 the Dutch East India Company governed these possessions but they are now administered by a Governor General assisted by a Council of Five. The religion is chiefly Mohammedan. The chief industries are agriculture and tin and coal mining. Cap Batavia.

Dutch Guiana (or *Surinam*) Dutch colony on the N coast of S America situated between British and French Guiana and bounded on the N by the Atlantic. The district is naturally rich but backward and unhealthy. There are several important rivers of which the Surinam Corantyne and Maroni are navigable. To the S is a rich forest region as yet largely unexplored but yielding valuable quantities of balata (gum) and in the lower valleys of the rivers and along the coastal plain agriculture is considerable and includes sugar copper cacao and maize. There are small mineral deposits of gold and bauxite but no industrial activity. Capital is Paramaribo. Area 84 300 sq m pop 133 700.

Dutch Language and Literature. For the language of Holland known as Dutch see GERMANIC LANGUAGES.

Its literature may be divided roughly into five periods (1) Middle Ages 1175-1550 (2) Renaissance and Reformation 1550-1600 (3) United Provinces 1600-1795 (4) Revolution and Restoration (1795-1830) (5) Modern 1830 to present day. Period (1) is chiefly remarkable for translations of legends and romances. Period (2) is dominated by the influence of Erasmus (qq v). Period (3) is the golden age of Cats Huygens Vondel and Grotius (qq v). Period (4) is one of translation and imitation of German French and English originals. The modern period (5) includes Da Costa and van Lennep. The achievements of Dutch literature not inconsiderable in themselves are made more remarkable by the historical geographical and

linguistic odds against which it has triumphed

Dutch Metal, *see* BRASS

Dutch New Guinea, *see* NEW GUINEA

Dutch Wars, three wars fought between England and Holland (1652-74), also wars between France and Holland (1667-78)

The first Dutch War (1652-4) between England and Holland was caused by rivalry over E. Indian trade and North Sea fisheries. The immediate occasion was the Dutch claim to carry goods to France during a war with England. In 1652, the English and Dutch fleets under Admirals Blake and van Tromp came into conflict in the Channel, and the Dutch were driven off with the loss of 2 ships. The Dutch harried the Channel while Blake destroyed their herring trade in the North Sea. In Nov. Blake was defeated by van Tromp off Dungeness. In 1653 a running fight in the Channel lasting 3 days resulted in heavy losses to the Dutch fleet. In July 1653 the Dutch were severely beaten in an action fought off Texel, and peace was concluded by the Treaty of Westminster, 1654, whereby the Dutch submitted to the English in the matters under dispute.

The second Dutch War (1664-7) was caused by disputes between Charles II's Government and the Dutch over the slave trade. In 1664 the Dutch colony of New Amsterdam (now New York) was captured by an English squadron. In June 1665 a Dutch fleet was severely defeated off Lowestoft. The next year the Dutch, under De Ruyter, defeated the English fleet under Admiral Monk and Prince Rupert off the North Foreland, and blockaded the Thames estuary. In 1667 the Dutch sailed up the Thames into the Medway and burned some of the shipping there. The Peace of Breda in 1667 ended the war, giving the Dutch their way in certain matters of trade in return for New Amsterdam.

The third Dutch War (1672-4) was part of a series of European struggles

centring round Louis XIV of France. By the Treaty of Dorn (1670) Charles II had made a secret alliance with Louis XIV of France. In 1672 the Dutch were provoked into a naval war with England by an attack on their trading ships coming up Channel, and were victors in an action in 1673 off the Suffolk Coast, and again in 1673 off the Texel. The English made peace in 1674 owing to internal troubles arising from opposition to Charles, and particularly to his pro-French policy.

A series of land campaigns against the Dutch was fought by the French during this war in 1672-5. Louis attempted to divest Holland of allies, was at first successful. England, by the Treaty of Dorn, and Sweden by the Treaty of Stockholm in 1672, promised to support Louis XIV. The French campaigns in Holland in 1672 opened successfully, the army penetrating with little resistance to Amsterdam. The flooding of the fields prevented any further French advance. Holland had found other allies in the Electors of Mainz and Brandenburg. The neutrality of Spanish Flanders was broken by French troops, and Spain declared war on France. In 1673 campaigns were fought in the Netherlands and in Germany, ending indecisively. In 1674 England made peace with Holland, and Denmark entered the war against France. The campaign of 1674, apart from Louis's successful sieges of several Dutch cities, is marked by the battle of Seneffe between the French and the Dutch, Spaniards, and Austrians under William of Orange. It was indecisive, but the loss of it on both sides was heavy. In 1675 the French were more successful. The war continued in Flanders, Germany, and Spain for the next 3 years, consisting mainly in the capture and recapture of different fortresses. In 1677 the French captured Valenciennes, and in 1678 defeated William of Orange and the Dutch army at the last battle of the war, St. Denis. The Peace of Nymwegen (1678)

cluding the war between France and Holland gave the former country little more than a few frontier fortresses. The war with the Empire continued until the following year. As a result of this war the Dutch found their political and commercial power considerably weakened while Louis XIV and his successors were to have difficulty in financial matters.

Dutch West India Company a chartered company granted a monopoly of trade in the Atlantic Ocean with America and Africa by the Dutch Government in 1611. It was thus complementary to the Dutch East India Company which traded in the other hemisphere. Its capital and management was divided among the provinces and it was supported by the States General which also claimed a share of the profits. The principal trade was in slaves from Africa to America where short-lived settlements were established in Brazil and New Netherland and permanent colonies gained in Dutch Guiana and several W Indian Islands.

Dutt, Romesh Chunder (1848-1909) Indian statesman and author educated at University College London and called to the Bar in 1871. He was a member of the Indian Civil Service from 1871 to 1897 and a divisional commissioner in 1894 and 1895. He became Revenue Minister of Baroda in 1904 and Prime Minister in 1909. He was created C.I.E. in 1897. He was the author of a *History of Civilisation in Ancient India* (1889-90) renderings in English verse of the *Mahabharata* (1899) and *Ramayana* (1900) as well as historical and social novels and books on the economic history of India.

Duumviri, two magistrates acting conjointly in ancient Rome. The most important Duumviri were those concerned with the administration of justice called Duumviri furi dicundo.

Duval, Claude (1843-1870) romantic highwayman. Lorn at Domfront in Normandy in his boyhood he entered domestic service. At the Restoration

he came to England in attendance on the Duke of Richmond whose service he deserted to become a gentleman of the road.

A huge sum was offered for his capture and he was forced to seek refuge in his native land. He soon returned to England but was taken and hanged at Tyburn. In St Paul's Covent Garden may be seen the following epitaph.

Here lies Du Vall Reader if male thou art

Look to thy purse if female to thy h art

Dvina, name of two Russian rivers. The N Dvina is formed by the confluence of the R. Yug and Sukhona near Ustyug and flows NW to the White Sea. It is joined from the right by the Vychegda at Kotlas and among the towns on its banks are Pokrovsk, Oseredok and Sivscoe. It is free from ice about half the year. Length c 1000 m. The W Dvina or Duna rises in a small lake to the S of the Dmyansk hills and flows first S to Vitbsk where it turns sharply WNW and flows through Latvia to the Gulf of Riga on the Baltic. Towns include Polotsk, Daugavpils and Riga. It is navigable from Vitbsk. Length 650 m.

Dvinsk see DAUGAVPILS

Dvorák [D'VOR ZHANE] Antonín (1841-1904) Bohemian musician composer of the *New World* symphony and the popular *Humoresque* was the son of an unkeeper of the village of Mülhausen in Bohemia and was taught the violin by the local schoolmaster. At the age of 16 he went to Prague to study music at the same time earning a little money by playing in cafés. He next secured a position in the Prague National Theatre orchestra as viola player under Smetana who encouraged him in his ambition to become a composer. His first notable works were a cantata *The Hut of the White Alouin* (1871) succeeded by some orchestral works which won him a Government pension and the interest and encouragement of Brahms. His *Slavische Tänze* (1878) gained him a European reputation.

in 1883 the London Musical Society performed his *Stabat Mater* (1876) Dvorak's 3 years' residence in America as Director of the New York National Conservatory resulted in his best-known symphony, *From the New World*. This work and his chamber music still maintain their popularity, though his operas and choral works are somewhat neglected.

Dwarf Stars, *see* COSMOLOGY

Dwarf Trees. Many kinds of trees can be dwarfed into a tiny semblance of mature trees. The Japanese have studied the art for centuries, but their methods remain a secret. They usually work with coniferous trees, but deciduous, broad-leaved trees can be reduced in the same way. One method is to grow a seed inside an overripe orange, supported in a wire framework, and to cut off the roots as they pass through the skin. A very small pot of soil can be used, the seed should be planted and allowed to germinate naturally, and the soil then pressed hard about its roots, the water supply discreetly reduced, and the seedling exposed to light for only a few hours a day. The regulation of light requires care, a plant can live if supplied with full daylight for but a short time each day, but will not survive continued exposure to reduced light in the same way.

The plant will push its roots through the hole in the base of the flower-pot and these must be cut off with a sharp knife. When the plant is several inches high, the terminal bud is pinched out, and lateral buds then develop which are also pinched out when these have grown a few inches. Later culture depends on the shape desired.

Dwight, John (fl. 1670-1700), one of the earliest of English potters to attain distinction. The date of his birth is unknown. He came from the N of England, and established works at Fulham, London. In 1671 he took out a patent for the "Mystery of transparent earthenware, commonly known by the names of porcelain or china and of stoneware, vulgarly called Cologne ware."

Specimens of his work can be seen in the Victoria and Albert Museum.

Dyaks (or *Dayaks*), tribes inhabiting Borneo and sometimes regarded as the aborigines of the island, sometimes as early immigrants from Malaya or Sumatra. They are akin to the Malays, but are lighter in colour and more slightly built. Their chief industries are the manufacture of iron and steel implements, dyeing, spinning, and weaving. They speak a mixed dialect, including a large number of Malay words. Formerly they were head-hunters, and skulls, especially of enemies, were held in great veneration. This practice has now been almost abolished. In warfare they use 8 ft blow-pipes with poisoned darts, long spears, and curved swords. Their number is $2\frac{1}{2}$ millions.

Dyeing. Dyes (*qv*) are classified into a great many groups, which depend upon their practical mode of application. Some dyes require that the substance to be dyed should be first treated with a *mordant*, without which the dye will not adhere. Thus usually deposits, on the fibre or other substance, a material which has a strong attraction for the dye-stuff. Thus the *acid dyes* will dye wool and silk without mordanting, but cotton only when it has been coated with a *basic mordant*, such as aluminium hydroxide. The *basic dyes* also have a direct affinity for wool and silk, but cotton needs to be previously mordanted with a fatty acid or tannic acid. The *substantive* or *direct dyes* can be used without mordants. *Vat dyes* are insoluble in water, but can be reduced to what are called *leuco compounds* (*see* DYES), which are soluble in alkalis and colourless. When a material is soaked in these solutions and then exposed to air, the colour develops owing to oxidation. Indigo is an important dye of this class. Such dyes are extremely fast to washing. In a similar way, what are called *developed, coupled, and naphthol dyes* are also developed by performing chemical reactions on the actual fibre.

under treatment but in these cases by immersion in suitable liquids. Before dyeing fabrics require to be scoured (washed) and frequently also bleached (see BLEACHING). The fabric is then mordanted if necessary and the dyeing process proper can then be performed.

The *acid dye stuffs* are soluble in water and when acidified the dye acid is set free, this often being comparatively insoluble in water. They are used very extensively for wool and for mixtures of wool and silk, wool fabrics being always dyed with them, unless exceptionally fast effects are desired. Wool requires to be dyed at boiling temperature but silk is injured by boiling and in any case gives better results at a temperature of c. 180-200 F.

Basic dye stuffs are very largely used for dyeing silk and leather but not so much for wool and hardly ever for cotton. Soap is used generally as an assistant but it is generally necessary to retard the action of the dye which may be too rapid at first, the assistant being added towards the end of the process. The goods are afterwards often treated with tannic acid by which the fastness of the colour is improved and this is sometimes allowed by treatment with tartar emetic which forms an insoluble compound with the tannic acid and still further protects the dye.

The vat dye-stuffs include indigo, Tyrian purple, madder and other colouring materials which have been known from time immemorial.

The name *vat* is derived from the vessel in which the reduction of the dye-stuffs to a leuco compound and the process of dissolving it in alkali are carried out. For indigo dyeing the vat is prepared by grinding the indigo to a fine powder and suspending it in water containing a reducing agent and an alkali which dissolves the reduction product and so white as fast as it is formed. The reducing agent may be supplied by fermentation, the bacteria reducing enzymes and hydrogen

chemical reducing agents such as copperas (ferrous sulphate FeSO_4), zinc dust and sodium hyposulphite are also used. Indigo white is also sold ready made, the vat being prepared by adding it to water containing glue, ammonia and sodium hydro-sulphate.

What are known as the *mordant dye stuffs* include many natural substances such as *logwood*, *cochineal*, *fustic* and *madder*. Of these logwood is the only one still used except for special purposes. The mordant generally employed is a mixture of potassium bichromate and sulphuric acid in very dilute solution, the goods being boiled in this for one to two hours.

The development of artificial silk (see CELLULOSE) set the dyer very serious problems, since the fibres of some of its varieties are quite different in constitution from the natural cellulose from which they are made. Viscose cuprammonium silk and Chardonnet silk are all similar to cotton and can be dyed in the same way but acetate silk (Celanese) which has in many respects superior properties to the others will not take many common dye-stuffs at all. This has led to the development of special dye stuffs many of which are modifications of dyes used for other purposes but others are new as for example the *ionanines*. These require to be developed on the fibre.

Home Dyeing. Dyeing of curtains, clothes and furniture covers can easily be carried out at home with any of the preparations on the market and is quite satisfactory if the directions are followed faithfully. Preliminary weighing to determine the amount of dye required, washing of the material to remove dirt and grease, the removal of buttons and trimmings, the unpicking of hems and pleats and the turning back of cuffs and collars must not be scamped. The suitable type of dye for the particular material must always be chosen. Mix sufficient to cover the article and dye a small test strip remembering the large

will be a little lighter in shade. The cloth may then be immersed, and kept in motion below the liquid level for from 10 to 40 minutes. The dye usually should be hot, but not boiling, except with special cold water dyes which give a pale pastel shade. Rinse thoroughly in cold water with salt and vinegar added to fix the dye and give brightness, then peg out to dry. In ironing protect the article with a cloth.

Knot dyeing gives some pleasing effects. To dye curtains in horizontal stripes, roll longitudinally and tie tightly with string at the required intervals, say every 3 or 4 inches. When dyed, the parts tied will be lighter in colour, toning gradually to the darker shade. Colour can be laid on in stripes by squeezing dye paste from the tubes in lines, folding the cloth and immersing in hot water. Designs drawn on material with dye crayons and ironed with a hot iron will withstand constant washing. Leather, velvets and others which cannot be washed require special spirit dyes, which are expensive except for small articles.

See S R Frotman and E R Trotman, *The Bleaching, Dyeing, and Chemical Technology of Textile Fibres* (London, 1925).

Dyer, Reginald Edward Harry (1861–1927), British general, entered the Army in 1885 and went to India. He became Colonel in 1910 and Brigadier-General and C.B. in 1917. In April 1919, in dealing with the disorders at Amritsar, he ordered his men to open fire on a native crowd, as a result of which over 350 Indians were killed. For this Dyer was severely censured, and retired from the Army in July 1920. He settled at Bristol and in his later years invented a range-finder for sighting aircraft.

Dyes, substances which are applied to materials, usually textiles, for decorative purposes, to give them a colour different from that which they originally possessed. Dyes may be divided into two principal classes, natural and synthetic, the latter being

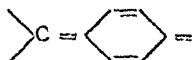
by far the most numerous and important.

One of the principal animal dye-stuffs is cochineal, which is obtained from a Mexican insect; it is a carmine dye formerly much used for colouring wool and silk. Another animal dye-stuff of great importance in olden times was Tyrian purple, obtained from the secretions of a certain Mediterranean sea-snail, and was used to produce the purple of the robes of Roman emperors. The colour of the extract is yellow, but when fabrics dipped in it are exposed to sunlight, the colour changes to a deep purple. Other pigments are melanin, to which all the animal blacks and browns are due, and turaxin. This red pigment, which occurs on the feathers of some African parrots, is water-soluble, a very unusual feature in natural dye-stuffs. The result is that after a shower of rain the bird loses its brilliant red colour and becomes a pale pink till it can secrete more of the pigment.

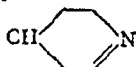
The dyes of by far the greatest industrial importance are the vast group of synthetic products known as coal tar or aniline dyes. These are all aromatic products obtained synthetically from aromatic raw materials, (all most exclusively hydrocarbons) which are largely found in and produced from coal-tar. The classification of these dyes can be made on the basis either of their chemical constitution or of their behaviour towards fibres. They are here discussed from the point of view of their chemical nature, especially since many of them are used for purposes other than, and additional to, the dyeing of textiles.

The first correlation between colour and constitution was made in 1868 by the German chemists Graebe and Liebermann, who observed that all coloured substances were chemically unsaturated, and that on saturation they produced colourless materials (leuco-derivatives). The next step was taken in 1876 by Witt, who postulated the existence of certain colour-producing groups to which he gave

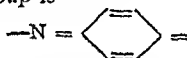
enyl-methane and triphenyl-methane. Of the diphenyl-methane derivatives the most important is Auramine. The triphenyl-methane dyes are much more important and extensive. One of the principal compounds made from it is Pararosaniline, from which is obtained Magenta or Fuchsine (qv). Dyes of the triphenyl-methane series are characterised by the presence of the chromophore



Quinoline and Acridine dyes These are derived from hetero-cyclic nitrogen-containing ring-compounds. The quinoline dyes are not very suitable for the colouring of textiles, and are used more as photographic sensitisers. The quinoline and acridine dyes contain the chromophore



Quinone-imine dyes are a very large and important class which it will be convenient to subdivide farther. Most of these are derived from quinonidimine, and a typical chromophore of this group is



Azine dyes contain a heterocyclic ring with 2 nitrogen atoms. To this group belongs mauveine, the first coal-tar dye, discovered by Perkin in 1856.

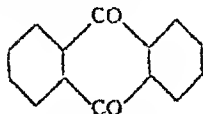
Oxazine dyes contain oxygen in the ring as well as nitrogen. Typical members of this class as Meldola's blue, Nile blue, and galloeyanine.

Thiazine dyes have a chemical structure similar to that of the oxazines, with a sulphur atom in place of the oxygen. The most important member of this series is methylene blue, other members being thionine blue G and methylene green.

Thiazole dyes are based on a heterocyclic sulphur-containing ring, but five-membered instead of, as in the case of the thiazines, six-membered. The

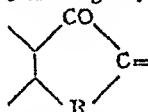
chief member of this class is primuline, which forms a number of derivatives.

Anthraquinone dyes This group (also known as the anthracene dyes) is of considerable importance. The parent substance is anthraquinone (qv), and the characteristic chromophore of this class is—



The most important member is alizarin (qv), which also occurs naturally in the root of the madder, whence it was obtained till the synthetic product, first manufactured in 1868, drove the natural dye out of the market.

Indigo dyes These are the group of dyes to which indigo and its derivatives belong. The characteristic chromophore of the group is



R is usually NH or S

Indigo itself is a naturally occurring blue dye found in the juices of several Indian plants in the form of a glucoside. Natural indigo was used as a dye for many centuries, but has now been almost completely replaced by the synthetic product which was first made in 1880.

Sulphide dyes These are produced by heating together some organic compounds with sodium sulphide. The constitution of these substances is in a large number of cases still in doubt, but nevertheless some of them are of considerable commercial importance. It is certain that many of them contain the thiazine and thiazole rings. They are vat dyes, and some of the chief examples are Italian green, immediate yellow GG, hydron blue, and vidal black.

The above classification—whilst not complete—covers all the more important

ant types of synthetic dyes. It should be noted that the chromophores given as characteristic of each group are not necessarily exclusive and that the groups may also contain other chromophores not mentioned and in addition to their own characteristic chromophore that of another group also.

In addition to their principal uses as colouring materials for textiles the synthetic dye stuffs also find a number of subsidiary uses of increasing importance. One of the more important of such uses is their employment to colour photographic plates and thus render them more sensitive to light of certain wave lengths. A dye used to a considerable extent for this purpose is erythrosin (see PHOTOGRAPHY).

Consult *Artificial Dye Stuffs* by A. J. R. Ramsey and H. C. Weston (London 1917). *Lachimie des matières colorantes organiques* by P. Castan (Paris 1920). *Theories of Organic Chemistry* by F. Hentrich. English translation by T. B. Johnson and D. A. Hahn (New York 1922.) chapter XVI.

Dyke, Sir William Hart (1837-1931) 7th Bart. M.P. 1865-1906 and famous as Disraeli's Whip in House of Commons. Chief Secretary for Ireland 1885-6 and Vice President of the Committee of the Council on Education 1887-9. He and two others drew up rules for lawn tennis in 1873 and played the first game at Lullingstone Castle Kent.

Dyke (or **Dike**) a ditch or its earth works. Though etymologically the same word as ditch the term often denotes earthworks built to reclaim land from the sea or rivers. Dykes are sometimes built to confine straggling rivers within their bounds either to reclaim land along their banks or to render the rivers deeper and more fitted for navigation. They are very common in Holland where large areas of land are below sea level and huge dykes form the banks of the Mississippi R. U.S.A.

Dyke (geol.) a vertical parallel-sided wall like body composed of igneous material rising from below and intruded

into the earth's crust at no great depth from the surface. Dykes often follow lines of weakness in the rock or accompany faults (qv) and often stretch across tracts of country for a considerable distance generally in a nearly straight line. They vary enormously in thickness and in length may be anything from a few yards to nearly 100 m. in length. In Scotland the dykes in the Clivaland dyke of Yorkshire are over 60 m. long. Innumerable narrow dykes occur in the W. of Scotland especially in Mull and Arran. Almost all run in N.W.-S.E. direction and they are very uniform in composition.

In Mull also is found a special type of dyke the ring-dyke intruded along lines of weakness of the same shape. It exhibits a ring shaped outcrop. Like all intrusive rock masses dykes frequently alter the rocks into which they are intruded.

Dykes, John Bacchus (1833-1876) composer of Church music and some well known hymn tunes including 'Jesus lover of my soul' and 'Nearer my God to Thee'. Born at Hull he was minor canon at Durham.

Dynamics The science of dynamics is that branch of mechanics which consists of the study of the motion of matter and its causes. It is generally divided into *kinetics* and *statics* the former dealing with actual motion and the latter with states of balance in which no motion occurs because the forces tending to produce it are so arranged that their effects neutralise each other. The founder of dynamics was Galileo (qv). Newton (qv) summed up and dealt further with the whole subject in his *Principia* in which he stated the three laws of motion: (1) every body persists in its state of rest or of uniform motion in a straight line unless it is compelled by some force to change that state. (2) the rate of change of the momentum of a body is proportional to the force acting on it and is in the direction of the force. (3) action and reaction are equal and opposite.

First Law The product of the mass of a body and its velocity is known as its *momentum*

If a force, motion, etc., is represented by AD (Fig 1) we can find its components in any two directions by drawing lines from A in these directions and forming a

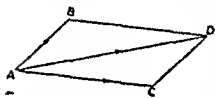


FIG 1

parallelogram. Thus, supposing a body is resting on a sloping surface or inclined plane at A in Fig 2, the force of gravity on it is acting vertically downwards along the line AD. If it is desired to know how it will move down the slope, we must measure the force urging it in this direction. We know that the force acting along AB is merely pressing the body on to the slope, and cannot affect its motion, so if we draw a line AC along the surface of the slope, and complete the parallelogram, the length of AC as compared with AD will represent that part of the force of gravity which is available to urge the body down the plane. Excellent illustrations of these principles will be found in the articles AEROPLANES and SAILING BOATS AND SHIPS.

It is a familiar fact that to effect motion against a force requires the performance of *work*. We also know that energy must be expended in doing work. These notions of work and energy have been given a precise form in physics, and the fundamental law known as the *conservation of energy* has been discovered. According to it the

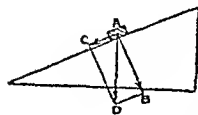


FIG 2

sum total of the energy in the universe is constant. A moving body contains energy by virtue of its motion, this energy being called *kinetic energy*; the energy contained in a body by virtue of its position is called *potential energy*. Kinetic energy is measured by one-half of the product of the mass of a body into the square of its velocity ($\frac{1}{2}mv^2$).

A most important notion in dynamics is the centre of mass or gravity. It can be shown that a point can always be found for any body or collection of bodies such that the mass of all the bodies taken together acts as if it were concentrated at this point. This is true only as regards translational motion, the moment of inertia of any body rotating about a given axis is not the same as if the whole mass of that body were concentrated at its centre of gravity.

The centre of gravity has many important applications. For instance, if a body of any shape is resting upon a table, it will fall over unless a line drawn vertically downwards through its centre of gravity passes inside the base on which it is resting (Fig 3). The whole force of gravity on the different parts of the body acts as if it were a single force passing through the centre of gravity.

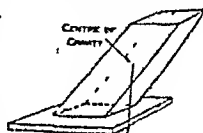


FIG 3

If we hang a body up by any point of it so as to leave it free to turn, it will come to rest

in a position such that its centre of gravity is exactly below the point of support, just as if the whole mass were concentrated at that point (Fig 4). The centre of gravity affords us an

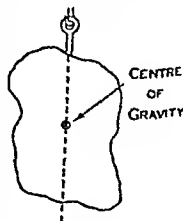
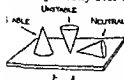


FIG 4

excellent example of the nature of *equilibrium*, that is to say, a balance of forces such that no motion takes place. There are three kinds of equilibrium, stable, unstable, and neutral, and these are perfectly illustrated by placing a cone upon a table in the three positions shown in Fig. 5. In the first position the cone is in stable equilibrium, if it be tilted and then released, it immediately returns to its original position. In the second

position the equilibrium is unstable. If we ever succeeded in balancing the cone on its point (by getting its centre of gravity exactly over this) the least



breath of air would be sufficient to upset it. In the third position the cone can be rolled into

another position without its having any tendency to return to its first position or proceed farther.

Dynamite an explosive consisting of nitroglycerine (90%) which has been absorbed in some inert material such as kieselguhr (diatomaceous earth), sawdust or wood pulp. The nitroglycerine content of dynamite is generally 73 per cent and sodium nitrate is also sometimes added to increase the explosive force. Dynamite was invented by the Swedish chemist Nobel in 1867. It has the great advantage over nitroglycerine in being much less sensitive to shock and its explosive effect can be calculated more accurately. Dynamite has to be fired by a detonator; mercury fulminate is usually employed. It is used for blasting but not as a propellant. See also EXPLOSIVES.

Dynamometer an apparatus for measuring power or rate of doing work. Mechanical power is measured (see DYNAMIC) by the product of a force into the rate at which motion is produced by or against it occurs. The simplest form of dynamometer is the spring scale dynamometer very frequently used to measure the power generated by electric motors and other engines. These are set to work against a brake formed by a strip of friction material stretched over a smooth wheel turned by the motor. The brake band is attached at both ends to spring balances and when the motor is running the difference between the readings of the balances indicates the force of friction exerted on the circumference of the wheel. If we know the speed of

motion of the latter and the radius of the wheel we can calculate the rate at which power is being generated by the motor.

The **Prony brake** is a similar device which is very easily adapted to any machine. It consists of brake shoes clamped to the shaft of the machine and carrying an arm which is prevented from rotating by a weight which can be adjusted. The dynamometer of Fig. 1 may also have one of the spring balances replaced by weights. In the *torsion dynamometer* the power is transmitted along a shaft which twists more or less under the stress. The degree of twist can be observed by suitable means and from it the force transmitted can be reduced. Since all shafts are elastic it is possible to make use of an actual transmission shaft to measure the power which it is transmitting. Mechanical brakes may be replaced by *eddy current* or *Foucault* brakes of a variety of forms and for the measurement of very large powers. In special cases the rate of generation of power may be measured by the rate at which heat is generated, the heat being caused to warm a fluid flowing at constant speed. Electric

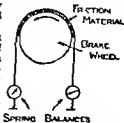


Fig. 1. Prony Brake Dynamometer

power is measured by the eddy current dynamometer (see ELECTRICAL MEASURING INSTRUMENTS). The word dynamometer is used by physicists

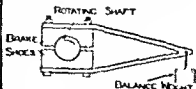


Fig. 2. Prony Brake

power is measured by the eddy current dynamometer (see ELECTRICAL MEASURING INSTRUMENTS). The word dynamometer is used by physicists

logists to denote apparatus by which muscular force is measured

Dynamoes and Electric Motors. The word "dynamo" is an abbreviation for "dynamo-electric machine," i.e. a machine in which both dynamic (or mechanical) energy and electrical energy can be utilised or produced. The term strictly applies either to an electric motor or to a generator, but the abbreviation "dynamo" is usually understood to mean a generator.

A generator is a machine in which mechanical energy is converted into electrical, while an electric motor is a machine in which electrical energy is converted into mechanical. Fundamentally there is no difference between generators and motors, for the basic

coil (in accordance with Faraday's law of electromagnetic induction) If the ends of the coil are joined by a wire, a current will flow in the coil and in the wire. The magnet and coil will then constitute a simple generator.

If instead of the force necessary to turn the coil being supplied, a current is caused to flow in the coil by connecting the coil ends to a suitable supply, the existence at the same time of a current in the coil and a magnetic field linked with the coil will produce forces on the coil which in most positions of the coil tend to turn it about the fixed axis. The magnet and the coil of wire then form a rudimentary motor.

Motors and generators such as we are familiar with to-day consist of coils and systems of electromagnets with the necessary parts to make the machine mechanically strong and reliable. From these basic principles machines have been developed until now there are generators of types and sizes ranging from the midget which lights the lamps on a bicycle, is driven by the legs of the cyclist, and weighs perhaps a pound or so, to the modern central station generator of 100,000 h p and upwards, which will light 1,500,000 ordinary electric lamps, is driven by a steam turbine, and takes nearly a ton of coal a minute in the boiler furnace to keep it going. Similarly, there are motors ranging from the synchronous motor driving a mains clock, with an output of perhaps $\frac{1}{2}$ h p., to motors of 5000-10,000 h p. driving steel mills which roll steel bars out like pastry.

Types of Motors and Generators Generators and motors are each divided into two main classes according to the type of current they supply or use—direct or alternating.

Direct or continuous current (D.C.) always flows in the same direction, and is always considered to flow from a given point in a circuit to a point of less positive (or more negative) potential. Direct current is the only kind of current obtained from accumulators and dry cells; it is outstandingly suitable for traction (railways and

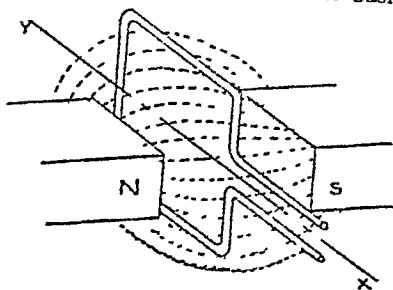


FIG. 1.

principles are the same, but in practice various types of each have their own particular characteristics which have been developed to suit the use of that type.

Fundamental Principles of Motors and Generators If a loop of wire is pivoted on its axis (the line XY in Fig. 1) between two unlike magnetic poles (or the two poles of the same magnet) many of the lines of magnetic force existing between the poles of the magnet will pass through the coil. Now if the coil is turned about the axis XY, the quantity of lines of magnetic force passing through the coil will be changed. In consequence, an electromotive force (which is an electrical pressure and is commonly measured in volts) is induced in the

tramways) and has no alternative for electrochemistry (electroplating and the electrolytic refining of metals)

Alternating current (A.C.) reverses its direction of flow a fixed number of times in a second. The time during which current starts to flow in one direction reaches its maximum in that direction decreases reverses reaches its maximum in the reverse direction and decreases again to nothing is called a cycle or a period. The number of cycles or periods in a second is called the frequency or periodicity. For electricity supply the standard frequency in Great Britain is 50 in N. America it is 60 while frequencies from 15 to 100 are still in use in various places. Alternating currents of very much higher frequencies are used for radio purposes frequencies of the order of 1 million being widely used for broadcasting.

Alternating current is nowadays much more widely used than direct current for the supply of electricity because much higher voltages can be used for generation of alternating current than of direct current and because it is easier and more economical to change the voltage of alternating current up for transmission and down for distribution than it is at present to do the same with direct current.

Alternating Current Generators
Fig. 2 represents a section through the

netic field at any point (see ELECTRICITY)

Starting from the horizontal position the coil is turned in the direction of the arrows. The number of lines of force

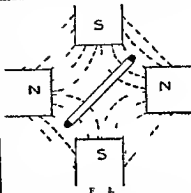


Fig. 2

passing through the coil will become smaller and smaller until the coil is in the position shown when few lines of force pass through the coil. As the coil continues to turn the lines of force begin to pass through the coil in the opposite direction until the coil is again horizontal. During this half period the change of flux is a decrease in one direction and an increase in the opposite direction that produces a voltage in the same direction round the coil for the half revolution. As the coil passes the horizontal position the number of lines of force passing through the coil begins to increase in one direction and remains in the same direction until the coil is again horizontal. During this half period the voltage continues in the same direction until the coil is again horizontal. The induced voltage is at a maximum when the coil is at right angles to the magnetic field.

When the coil is at right angles to the magnetic field the induced voltage is at a maximum. As the coil turns the voltage decreases until it is zero when the coil is horizontal. The voltage then increases again in the opposite direction.

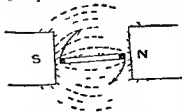


Fig. 3

coil and magnets shown in Fig. 1. The dotted lines represent the magnetic field but the lines have no actual existence serving only to indicate direction and magnitude of the magnetic field.

on the rate at which the coil is rotated. If, instead of having 2 magnetic poles, the simple generator had 4 poles—Fig 3—and the coil were rotated at the same speed, the frequency of the alternating voltage produced would be doubled, or for the same frequency only half the turning speed would be required. Thus the number of poles, the speed of rotation, and the frequency of an alternating-current generator are definitely related to each other.

If the coil is fixed and the poles are turned round it, the result, as far as the voltage produced in the coil is concerned, is the same. Similarly, the poles may be placed inside the coil—Fig 4. This is the basis of construc-

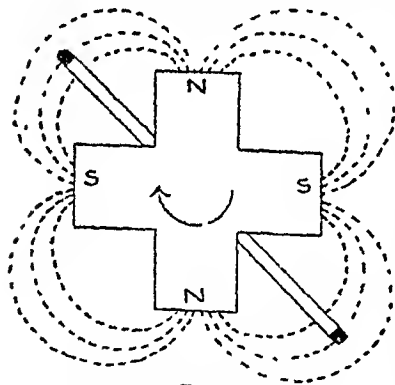


FIG 4

tion of most modern alternating-current generators. The coils are embedded in thin sheets of steel carried in a steel frame. The steel sheets, being highly magnetic, help to produce a strong magnetic field in the right position and also support the coils. The magnets, which are electromagnets—that is, the magnetic field is produced by a direct current passing through many turns of wire or strip copper wound round each pole—are mounted on the shaft, which is turned by the engine or turbine to which it is attached. Instead of one coil, as assumed in the

elementary generator, there are many coils spaced all round the machine, and these are connected together in groups so that the voltages in the various coils of a group are added together. In modern machines it is usual to have three such groups of coils, in each of which the voltage becomes a maximum in turn. Each group is then called a phase. It is possible to have almost any number of phases, but 3 phases are almost universally used because this results in the greatest economy of material with the maximum suitability for most requirements.

The speed at which a generator is driven is approximately determined by the type of machine used to drive it. This is usually a steam turbine, a water turbine, or an internal combustion engine. The first of these is a high-speed machine—usually 1500 or 3000 r.p.m. for 50-cycle power supplies, while the other two are lower-speed machines, usually running at speeds between 100 and 400 r.p.m. The design of the generator is primarily dependent upon the speed at which it runs, as far as shape and method of construction are concerned.

Alternating-current Motors If the fixed coils of a two- or more phase alternating-current generator are supplied with current from a supply of the same number of phases, a magnetic field is produced by the coils, and it turns round at the same speed as the rotating poles would turn if the machine were running as a generator of current of the same frequency. If the poles are once run up to this speed they will continue to turn at this fixed speed if the necessary magnetising (direct) current is supplied to the coils on the poles (field coils). This machine is then called a *synchronous motor*, because the field poles rotate in step with or in synchronism with the magnetic field produced by the fixed coils. The fixed coils are known as stator or armature coils.

If the rotating field coils are replaced by coils which are connected among

themselves in a closed circuit but are not supplied with direct current the rotating magnetic field cuts these coils and produces in them voltages and currents which circulate round the closed circuit. The interaction of the rotating magnetic field and the currents in the movable (rotor) coils produce forces which turn the rotor in the same direction as the magnetic field turns but at a slightly lower speed. This arrangement constitutes an induction motor. This type is self starting whereas the synchronous

coil twice in a revolution. Now if some kind of circuit were connected to the rotating coil the current in this circuit would change its direction in sympathy with the voltage. If however the connections between the external circuit and the coil were reversed periodically at the correct instant the current in the external circuit could always flow in the same direction round that circuit. This periodic reversal of connections is the fundamental difference between alternating and direct current generators.

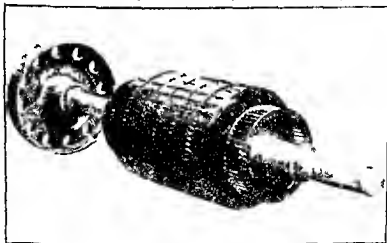


FIG. 10. A. D. 10. M. O.

motor must be brought up to speed by some external means or must be combined with some form of induction motor for starting.

There are other types of alternating current motors but the synchronous motor and the induction motor are easily the most important and the most widely used. Neither will operate on direct current.

Direct-current Generators. In the section on alternating-current generators it is explained how the voltage in an elementary two-pole single-coil generator changes its direction in the

The reversal is performed automatically by the commutator and brushes which really constitute a switch with sets of contacts for each coil so although the current in the external circuit is direct that in the coils connected to the commutators (the armature coils) is alternating.

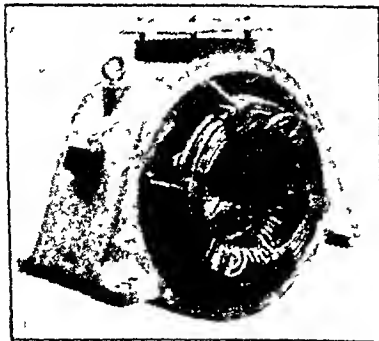
In a direct-current generator the field magnet system with its coils is usually stationary while the armature coils and the commutator are carried on the shaft and rotate. The current for the field coils is normally supplied by the machine itself.

Direct-current generators usually run at speeds of 1000 r p m or less, because it is difficult to build a direct-current generator suitable for much higher speeds. Consequently, either slow-speed driving engines, or high-speed turbines with reduction gearing are used.

Direct-current generators are often driven by alternating-current motors supplied from distant alternating-current generators in preference to generating direct current at the central station and then transmitting it to where it is required.

Direct-current Motors If a direct-current generator is connected to a suitable supply of direct current, it will function as a motor—in fact, a number of direct-current generators are supplying current to the same circuit and the driving engine of one is shut down, that generator will keep on running as a motor, the power necessary to keep it running being supplied by the other generators.

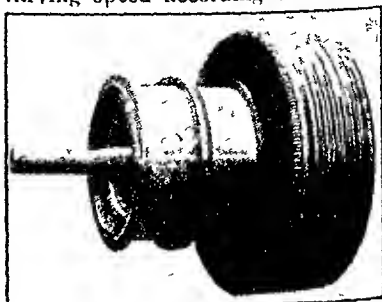
There are two main types of direct-current motors. In one the field coils are connected across the supply, and so the field current is constant. This is called a shunt-wound motor, and always runs at approximately the same speed, whatever the load on it.



Dynamo Stator, showing field windings

may be. In the other type the current through the armature passes through the field coils, so that the field current

is a variable quantity. This is called a series-wound motor, and runs at varying speed according to the load.



Armature of DC Generator

on it. Because of this variable-speed characteristic it is widely used for trains, trams, cranes, and lifts, as it is naturally suitable for frequent starting and stopping.

Consult The Dynamo, by C C Hawkins (Pitman), Specification and Design of Dynamo-Electric Machinery, by Miles Walker (Longmans)

Dysentery, see ENTERITIS

Dyson, Sir Frank Watson (b 1868), English astronomer, was Astronomer Royal of Scotland from 1905 to 1910; and Astronomer Royal of England from 1910 to 1933. He was elected F.R.S. in 1901, and 20 years later received the Royal Medal for his contributions to science. His more important literary works are *Determination of Wave-length from Spectra obtained at the Total Solar Eclipses 1900-1901* and 1905 and *Astronomy—a Handy Manual for Students and Others* (1910). He was knighted in 1915 (K.B.E. 1926), and is widely celebrated for his interesting public lectures.

Dyspepsia (or Indigestion), disturbance of the natural processes of digestion, due sometimes to organic disease involving the alimentary canal, but usually to errors in diet or to nervous causes. Over-eating, indigestible food, hurried, irregular meals, or insufficiently masticated food are all causes of dyspepsia; too much smoking, or excessive indulgence in alcohol

or tea are also predisposing causes. The nervous causes are generally worry or bad news. The symptoms of dyspepsia are pain in the stomach, nausea, vomiting, headache and general depression while the tongue is furred and diarrhoea or constipation may follow. Acute dyspepsia is often caused by severe exertion after a heavy meal and usually passes off after a time. If the attack is severe enough to cause vomiting the patient should fast for 24 hours and take a dose of calomel followed by a saline aperient. Children should be given castor oil.

Chronic dyspepsia is more likely to

be due to a disease or to long-continued indulgence in unsuitable food or in excess of alcohol. It is characterised by a feeling of distress after a meal accompanied by headache, flatulence and sometimes by regurgitation of acid or of half-digested food. Bicarbonate of soda may be taken with good effect and other useful medicines are quassia, gentian, pepsin, hydrochloric acid and cereals. The particular scheme of diet to be adopted varies with the individual case but new bread, pastry, highly seasoned meats and raw vegetables are generally to be avoided.

Dzungaria, *see* ZI NGARIA

Ea

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Ear

Ea, tribal deity of Eridu, an ancient city of Babylonia. A water deity he was looked upon as creator of the world in the Babylonian cosmogony and father of Marduk. See also BABYLONIAN RELIGION.

Eagle. (1) General name for large birds of prey of the falcion family. They have long curved claws, a powerful clutch for killing their prey, and a strong hooked beak for tearing it to pieces. They feed upon mammals, birds, and sometimes fish or carrion.

Eagles are found all over the world except in New Zealand, are of many varieties, and have a wide range of distribution. Two, the golden eagle and the white-tailed or sea-eagle, still nest in the Highlands of Scotland and the Hebrides, but only in small numbers, having been relentlessly slaughtered because of their habit of killing lambs, fawns, hares, and grouse. The golden eagle, or the related Imperial eagle, is the national emblem of Germany.

The sea-eagle, which feeds on fish, may be distinguished from the golden eagle by the tail being white and the lower part of the leg naked, not feathered. The white-headed or bald eagle is another sea-eagle found in N. America, and is the emblem of the United States. In the Philippines, there is a species called the monkey-eating eagle, from its habit of killing macaque monkeys. The harpy eagle of S. America is a large buzzard (q.v.).

(2) Military standard of the Romans, and still earlier of the Persians later adopted by the Holy Roman Empire, Austria, France, Germany, Russia, the United States, and Mexico. The Persian eagle was borne on the spearheads. The Roman eagle was adopted as an emblem in 104 B.C., and was first made of wood, later of silver and

bronze. It had extended wings, and often the head of the reigning emperor was shown below. The French eagle was adopted as an emblem by Napoleon I in 1804 and carried by all regiments and warships. It was gilded and crowned, and represented as perched on a thunderbolt. These eagles were destroyed during the temporary restoration of the Bourbons, reissued when Napoleon escaped from Elba, destroyed again after Waterloo, restored in 1852 by Napoleon III, and abolished in 1870.

(3) A gold coin of the United States, of the value of 10 dollars, or rather over £2 in English currency, which takes its name from the representation of the white-headed eagle, the emblem of the United States, which it bears. Double, half, and quarter eagles are coined.

Eagle, see GEOGRAPHICAL TERMS, GLOSSARY.

Ear, the sense organ in animals which in the higher vertebrates serves the double purpose of preserving balance and of hearing. In the lower animals it is probably mainly a balancing organ, and is known as an otocyst. This is a little sac or vesicle, open or closed filled with fluid and lined with epithelium, of which some of the cells are sensory and associated with the auditory nerve. The fluid also contains solid granular particles, otoliths, by the movement of which the sensory cells are affected. Such organs are found, for example, on the edge of the "umbrella" in jelly-fish, in many crustacea, as in the first antennæ of the lobster, and in a large number of mollusca—in the "foot" of the snail and freshwater mussel, for instance. Although the function of the otocyst is mainly for balancing, some mollusca are known to respond to sound.

In a great many insects definite auditory organs called chordotonal organs, of a different type from otocysts have been found. They consist of elongated bundles of modified cells in contact at one end at least with the integument which in some cases is altered at the spot to form a vibrating membrane the tympanum or drum. In grasshoppers for instance there is a drum on each side of the first abdominal segment. In the cricket it is on the fourth segment of the front leg.

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both sides of the body of simple sense organs capable of perceiving vibrations in the water of too low a frequency to be detected by the ear. In this class the ear is a membranous sac lodged on each side of the back of the skull between the skin and the brain. Both the cavity which contains this sac and the sac itself are filled with lymph. The vestibule is divided into an upper and a lower part. The lower or saccule gives off a short tube the lagena and a long tube the auditory duct which runs upwards and in the shark opens on the top of the head. The upper part of the vestibule the utricle branches into three semicircular canals one horizontal and two vertical set at right angles to one another. Each canal has a swelling close to the vestibule the ampulla the inner wall of which is ciliated as are those of the saccule lagena and utricle. Associated with these ampullae are otoliths consisting usually of fine calcareous grains but sometimes as in the cod as big as small pebbles. The auditory nerve enters the vestibule from the brain, and supplies all parts of the organ. Thus in all essential respects the ear in fishes is an elaborate otocyst principally for equilibration

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Another feature of the Mammalian ear is the pinna of cartilage and skin which surrounds and extends the orifice into which it helps to guide sound waves. It is very variable in development and is sometimes absent as in sea Mammals (the whale) and burrowers (the mole) but is typically much larger than in Reptiles or Birds in which it is at most an inconspicuous flap. The part of the internal ear that represents the lagoon of lower Vertebrates is except in the Monotremes spirally coiled like a snail shell hence suggesting the name cochlea given by human anatomists.

Earheart, Amelia (b 1898) American social service worker and air woman achieved fame by being the first woman to fly the N Atlantic which she accomplished as a passenger from Newfoundland to Burry Port Wales in June 1908. In May 1903 she flew from Newfoundland to Ireland in 13½ hours. During the World War she served with the Red Cross and was later in charge of a social service centre in Boston. In Feb 1931 she married Mr G P Putnam.

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opening of Parliament, and other State occasions. He was judge of the Courts of Chivalry in feudal times. The office was held by the Marshal family in Henry I's reign, and was eventually granted to the Howards by Charles II, 1672. It has descended in this line to the present Duke of Norfolk.

Earlom, Richard (1743-1822), English engraver in mezzotint, best known for his engravings of Hogarth's *Marriage à la Mode*. He also made plates from the works of Van Dyck and Rembrandt. His 200 prints after Claude Lorraine were published (1777-1819) under the title of *Liber Veritatis*.

Early Christian Architecture. The Early Christians were poor, and their places of worship presented a barn-like appearance. These plain structures spread as far to the E as Nisibis, and the Arabian Desert, and south as far as Khartum. Authorities disagree as to the origin of Early Christian Architecture. Some attribute it to Rome, others to Egypt and Syria. Wherever it was, there are few remains existing of these primitive churches.

In Rome the earliest basilica is the Lateran, whose primitive character has been entirely overlaid. Other Early Christian churches were old St Peter's, a huge structure taken down in 1506, St Clement's, at least interesting because of its well-preserved mosaics dating from the 12th cent., and Santa Maria Maggiore.

Nearly 800 years elapsed between the Early Christian Basilica at Rome and the appearance of the first Gothic Cathedral. Although there was a great development of style, practically all the essential features were preserved throughout this long period. There was a certain likeness in the design or plan of the Early Christian basilica and the Gothic church. Aisle, apse, arcade, and altar were all there, and enough space for a choir. The roof of the Early basilica was of wood where the span was greatest.

Germ of Gothic. Early Italian Christian buildings have Gothic-like features, as seen in the arcade of single

columns with their graceful capitals, a starting-point for the semi-circular arches suggestive of pointed arches and piers. The change from Roman to the "many-ribbed" Gothic began with the use of the arch in construction, followed by the vault of barrel form. Externally, the churches were very plain in appearance.

Another example is San Vitale, at Ravenna. The exterior is faulty, but within it is a place of surpassing beauty. In Syria there are distinct evidences of Greek sympathies in the mouldings and capitals, likely enough the result of imported labour. At Kalat-Seman, a church was built (c. 6th cent.) round the column where St Simeon Stylites spent 30 years of his life, the influence being Roman. In this church it is amazing how happily Roman fluted pilasters, Greek carved foliage, and Byzantine capitals were blended.

Domestic Building. Early Christian domestic architecture may roughly be divided into town and country, the villa, outside the town, occupying a larger area. The average size was 70-80 ft by 55 ft, but of this extent quite a good proportion was devoted to an open court. Houses were mainly of two stories, having a stone ceiling, roof, and floors, and probably a wooden staircase to connect the two floors. The doors were ornamented with architrave and cornice. All the houses faced south, and all were enclosed by high walls. In the poorer quarters of a town the means of access to the upper story was in most instances by stone steps from without. A few examples of three-storied buildings were recorded. At El Barah and Mujelna are the most important monuments.

Early Closing, see **SHOPS ACTS.**

Early English Architecture, the first of the three periods of English Gothic (see **ARCHITECTURE**), lasting from 1190 to 1245. It is characterised by lancet or long, narrow, pointed windows, which may be single or grouped in pairs, threes,

ves etc as in the Five Sisters window at York Minster. Doorways are elaborate convex and concave mouldings. Larger doorways are sometimes divided by a pier above which is in the case of pairs of lancets is placed a quatrefoil (beginning of plate-tracery). The carvings include the tooth ornament and the stiff leaf foliage succeeded by the ball flower. The shafts of the piers are often made of black Purbeck marble as at Salisbury; the capitals are plain ball shaped or covered with stiff leaf foliage. Draper patterns appear in the spandrels. Vaulting is greatly advanced by the use of the pointed arch beginning with the plain four ribbed vault. Flying buttresses appear. Toward the end of the period plate-tracery becomes general. The nave and triforium arcades are especially noteworthy.

Earn, Scottish river and loch in Perthshire. The river flows E from the loch into the Firth of Tay and is noted for salmon fishing. The chief towns on its banks are Crieff and Bridge of Earn, a popular holiday resort. There are a number of interesting ruins and old buildings in the district, which is fertile and highly picturesque. The loch is 6½ m long by ½ m wide; the river is 45 m long.

Earnest, a small sum of money or token given to bind a bargain between two parties. No contract for the sale of goods worth £10 or more is enforceable unless the buyer accepts part of the goods or gives something in earnest or a note in writing is made signed by the party to be charged.

Ear ring, a ring which penetrates or is fastened to the lobe of the ear or which hangs therefrom. Its origins are extremely remote. Civilised and uncivilised races have practised this form of self-adornment for thousands of years. In Greek and Roman times the custom seems to have been confined to women, but in the East it has been common to both sexes. Savage and primitive peoples have put the ear ring to grotesque

uses. Its form to-day among civilised peoples is usually a jewel or jewelled ornament of small size worn by women and fastened by a small screw to the lobe of the ear or more rarely by a thin wire through a perforation in the lobe. Its use by men is confined to an occasional believer in the old sailors' theory that the use of the ear ring improves the eyesight.

Earth. As at present constituted the earth appears to consist of three main concentric shells overlying a heavy core (*barysphere*) composed probably of metallic iron and nickel. Next to this is a layer of rock (*lithosphere*) which may be 500–1000 m in thickness and on which the various continents and land masses rest forming its upper limit. The greater part of the earth's surface is covered with water (*hydrosphere*) and the whole is enveloped in a tenuous bed of air some 200 m deep (*atmosphere*). Of these layers the barysphere and the lithosphere are inaccessible to man and their properties can only be inferred from observations of the surface materials and the known density of the earth as a whole (see *Geology*).

The age of the earth can only be estimated in so far as a theory of the origin of the solar system is available. On the basis of Jeans' theory it is between 1000 and 5000 million years. The theory of tides and the origin of the moon gives an estimate of rather less than 5000 million years. Study of the rocks and fossils and the salinity of the ocean confirms this giving a figure of c. 1500 million years while again the evidence of radio activity would be satisfied by an age of 1500–3000 years.

As to the origin of the earth the nebular hypothesis at one time popular has now been discredited though a modification of it was suggested by Lockyer who replaces the nebula by a swarm of meteors which gradually condenses by mutual attraction of its parts and becomes hot by the collision of individual members of the swarm. The recent theory of Jeans attributes the origin of the solar system to the

near approach of a star to the sun, which raised enormous solar tides that eventually caused a cigar-shaped portion to break away, and this in turn condensed to form the family of planets of which the earth is a lowly member. As we descend in mines we find the temperature of the rocks about us getting greater and greater, increasing $c 1^{\circ}\text{C}$ for every 100 ft of descent. The freezing-point of water is 0°C , and its boiling-point 100° , so that if the temperature goes on increasing at the same rate within the earth as it approximately does near the surface, then at a depth of 10 000 ft it would be great enough to boil water,

pressure, which increases with depth till it becomes many tons per sq in.

Density. The density of the atmosphere compared with that of water as unity (1) is a small fraction, and becomes less as we rise above sea-level, but that of the lithosphere varies from 2 to 6 according to depth and therefore pressure, while that of the barysphere is as much as 7, owing to the extreme pressure to which it is subjected. Evidence has been acquired to show that the tremendous pressure keeps it very solid, dense, and rigid, in spite of its very great temperature. The evidence arises from the gravitational weight, and mean density, of the

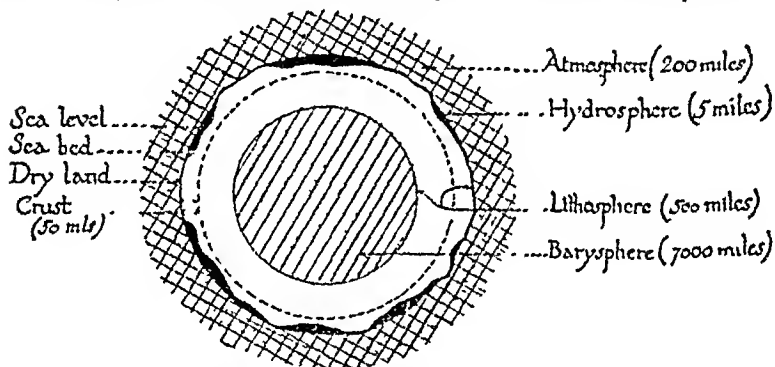


FIG 1.—Section through the Earth (By courtesy of the British Institute of Technical Engineering)

and at a depth of 100,000 ft, $c 20$ miles, it would be $c 1000^{\circ}\text{C}$, and therefore sufficient to melt the rock. This belief is confirmed by the fact that when springs come up from a great depth they are found to be hot, and sometimes issue as steam instead of water, while from certain parts of the earth's crust molten lava and red-hot stones are thrown up by volcanoes.

Pressure. The pressure of the atmosphere upon any portion of the earth's surface is $c 14\text{ lb}$ per sq in, and becomes less and less as we rise above sea-level. But any particle within the interior of the earth is subjected to an additional load of material and must therefore suffer a very great

earth from the rapidity with which vibrations like earthquakes are transmitted through it, and by analogy with the structure and composition of meteorites which have been examined.

Geographical Position. If we consider the earth to be a perfect sphere, the position of any point upon its surface is determined by two factors, latitude and longitude. Thus, the latitude of P (Fig 2) is the vertical angle θ degrees which it subtends at the centre of an equatorial plane XOX_1 , and the longitude of P is the horizontal angle ϕ degrees between its own and some standard meridian NXS —e.g. that through Greenwich. Meridians of longitude are great circles passing

through the Poles N and S parallels of latitude are small circles like BCP parallel to the Equator

Dimensions The earth is not a true sphere but is flattened at the poles and bulges at the Equator somewhat like an orange this is a consequence of its axial rotation described below The shape of the earth has been deduced mathematically from theoretical considerations and there are 3 important practical methods of confirmation (1) By survey measurements of arcs of latitude and longitude which show variations in the radius of curvature of the earth (2) by deter-

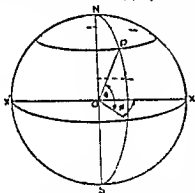


FIG. 1

mining differences in the force of gravity at different latitudes (3) by calculation from the parallax of the moon observed from different latitudes as described elsewhere (see OBSERVATIONS)

The following data are the most recent determinations

Polar diameter NS	7901 m
Equatorial diameter	~ 8136 m
Circumference XQX	24 860 m
Surface Area	196 million sq m
Volume	2541 million cu m

For celestial Gravitation As a consequence of the law of gravitation

(g) any body in the neighbourhood of the earth no matter at what point it is situated is attracted towards it with a force which increases with the mass of the body and decreases with its distance from the earth's centre Hence bodies near the earth's surface appear to fall towards it with a regularly increasing speed—a uniform acceleration—which we denote by g Since g increases as distance from the earth decreases the shape of the earth can be calculated from its variations at different points of the earth's surface Its value can be determined by experiments in mechanics with a simple pendulum It is found that g is $32 \frac{1}{8}$ ft/sec/sec at the Equator (earth's greatest radius 3963 m) and $32 \frac{1}{6}$ ft/sec/sec at the Poles (earth's smallest radius 3950 m)

The weight or really the mass of the earth is determined by comparing its force of attraction upon a small mass m with that due to an accurately known mass M The result appears in billions of tons but is usually expressed by the statement that the mean density of the earth is $5 \frac{1}{2}$ times that of water the density or mass per unit volume of water is 62.5 lb per cu ft This shows that the bulk of the earth's material must be solid rigid and packed very closely under extreme pressure

THE EARTH AS A PLANET

Axis of Rotation The effects of day and night are due to the fact that the earth is rotating about its short polar axis—an imaginary line from N to S The earth is thus like a spinning top with the N-S axis as a peg right through it The sun is constantly shining upon the earth which turns for heat and light, making a complete rotation of 360° in 24 hours The sun appears to move round us from W to E though it is better to regard it as fixed Any non-polar point on the earth's surface describes 1° of longitude in 4 minutes, and 90° in 1 hour.

to determine the longitude of any place

A moment's reflection enables us to realise that though all points on the earth's surface make a complete rotation in the same time, they do not move at the same speed because they have different length circles to travel. A point Q on the Equator XQX' has to cover the greatest distance of 24,860 m in 24 hours, and therefore moves at 1036 m per hour, whilst a point P in a distant latitude has only to circumscribe the small circle BPC in the same time, and therefore has a much smaller speed, the poles N and S are at rest. This varying surface velocity is a direct consequence of axial rotation, and leads in its turn to the deformed shape of the earth.

Orbital Revolution The earth is continuously moving through space in a fixed path round the sun, the time taken for one complete revolution is the year, and since the orbit is an ellipse and not a circle, the earth is at different distances from the sun at different times. The long radius of the elliptic orbit is a little more than 93 million miles, and the short radius is a little less.

Equatorial Inclination It is a remarkable fact that the earth's equatorial plane does not coincide with its orbital plane, but is inclined to it at a constant angle of $23\frac{1}{2}^\circ$, a fact which is directly responsible for the seasons (*qv*). Another consequence of equatorial inclination is that the sun is not *always* directly overhead at noon at the Equator, but only at certain times. This phenomenon occurs over a wide region around the Equator bounded by the Tropics of Cancer and Capricorn, at latitudes $23\frac{1}{2}^\circ$ N and S respectively. The sun shines vertically over the Equator on March 21 (the N spring equinox), and on Sept 22 (the N autumnal equinox); it shines vertically over the Tropic of Cancer on June 21 (the N Summer Solstice, midsummer), and vertically over the Tropic of Capricorn on Dec 22 (the N Winter Solstice, midwinter).

Inside the Arctic Circles (latitude $66\frac{1}{2}^\circ$ N), and in the Antarctic Circle (latitude $66\frac{1}{2}^\circ$ S), there is at least one day in the year during which the sun does not set, and at least one day on which it does not rise. And as the poles are approached, the number of such days increases until at the poles themselves there is darkness for 6 months and sunlight for the other 6 months.

Precession The inclination of the earth to its orbital plane is not confined indefinitely to a fixed direction. If we regard the orbit as the horizontal, and the perpendicular to it as the orbit vertical, then the earth's polar axis is inclined by $23\frac{1}{2}^\circ$ to this vertical. It is found as the result of very long observations that the polar axis turns very slowly round the vertical, completing a circle in 26,000 years, but always keeping at a constant inclination of $23\frac{1}{2}^\circ$ to it. In present times the polar axis points to the star α Ursæ Minoris, which we therefore call the Pole Star. But since our Polar line describes a circle of $23\frac{1}{2}^\circ$ radius among the stars, it is clear that different stars become polar at different times, thus, Vega will be the Pole Star some 11,000 years hence.

The cause of Precession is believed to be the gravitational pull of the sun and moon upon the earth's equatorial bulge. They try to make the earth's Equator coincide with its orbital plane, but owing to the earth's axial rotation its equator simply swings about that plane with a regular motion in a period of 26,000 years. In spite of the enormously greater mass of the sun, the moon is responsible for about two-thirds of the precessional effect owing to its shorter distance—it is less than a quarter of a million miles away, while the sun is over 90 million m distant.

Nutation The earth's polar axis does not move smoothly in its precessional circle of $23\frac{1}{2}^\circ$ radius. It appears to rotate slightly, and make very small circles in c 18 6 years. This is due to lunar-solar inequalities of precession. The moon's influence varies according

to its position in its monthly path round the earth—it is sometimes below the line joining Sun and Earth and sometimes above it. But the chief periodic variation of 18.6 years corresponds to a regular fluctuation of the moon's orbital plane.

Perturbations The earth does not keep steadily in its elliptical orbit but appears to wobble slightly in it with a very small zigzag motion. These disturbances are due to gravitation influences of the other planets and they vary somewhat on account of their ever changing distances. The effects are noticeable by variations in the ecliptic, the sun's apparent path in the sky, and are really due to fluctuations in the earth's orbital plane. These perturbations or planetary precessions effect the equinoxes just as does Lunar Solar precession but they do not effect the equator as that does.

Imposed on all these movements is that of translation through space which it shares with the solar system as a whole.

Earthenware *see* CERAMICS

Earth Inductor Compass, *see* AERIAL NAVIGATION

Earth Metals, the metals which form in combination with oxygen the substances known to the early chemists as alkaline earths. They are calcium, strontium and barium and are never found in an uncombined condition but oxidize rapidly into lime, strontia and baryta, the alkaline earths. These are characterised by being insoluble in water and unaffected by strong heat and were called alkaline because they were similar in properties to the alkalis. Until 1807 they were regarded as elements. The metals occur most often in the form of sulphates and carbonates, sometimes as peroxides.

Earthroot the tuberous roots of several umbelliferous plants common in Europe. The English earth or pig nut plant is slender, 1 ft high, bearing a few finely divided leaves and terminal umbels of white flowers. The root a roundish tuber covered

with a thin easily removable skin is not poisonous but is fit as food only for pigs. It flowers in May and June and is perennial. Several European species are edible.

Earthquakes are due to local disturbances of the earth's crust which set up a series of waves that may be felt as vibrations of greater or lesser magnitude according to the nature and extent of the disturbance and its distance from the point of observation.

Earthquakes broadly speaking can be grouped into three types: those associated with volcanoes; those due to slipping along lines of weakness near the surface and those due to large upheavals at great depths.

The deep seated earthquakes often show several apparent centres of disturbance. The average depth is usually something over 100 m, but as much as 800 m has been suggested as possible.

The waves of vibration travel with different velocities through the crust of the earth. The deeper the path travelled runs, the greater the velocity. From observation of the relation between depth and time taken, useful information about the nature of the interior of the earth can be obtained. A thick bed of sand or loose stones retards the wave considerably and lessens the shock felt beyond it. But a small deposit of sand or alluvium in a depression in the ground would receive almost the maximum shock possible and buildings on it would be more severely damaged than if they were built on hard rock.

The displacement during an earthquake is not only in a vertical plane. In the Californian earthquake of 1906 it was largely horizontal. It was vertical in the earthquake in Assam in 1897. The commonest types exhibit displacement in both directions. An example of an earthquake without any faulting is furnished by that at Messina in 1908.

It has been shown that earthquakes tend to occur along mountain ranges, especially those near the great rift

Pacific is girdled with a great ring of volcanoes stretching from the Andes through Central and N America, where they are more sparsely distributed, and down the Asiatic coast through Japan to the Malay Archipelago, and in general earthquakes accompany this vulcanicity. Another line of earthquakes stretches from the Alps through the Caucasus to the Himalayas.

Earthquakes are least frequent in the centres of oceans and continents, as in the interior of Russia, Egypt, and Brazil. They are small in magnitude, but fairly frequent in Switzerland, and numerous and large in Peru, Italy, Japan, and China.

When earthquakes occur beneath the sea, huge waves are formed, which radiate in all directions and, if they strike a coast, may sweep inland, overwhelming everything over a considerable area. In the Japanese earthquake of 1896 a wave 93 ft high was initiated. Smaller waves are known to travel 10,000 m.

By compressing soft beds, earthquakes may lower the level of land areas. They may also affect the water supply, especially the underground system, and have been known to produce avalanches and landslips.

It has been shown that the larger earthquakes tend to recur in groups at comparatively regular intervals, and the total yearly number of such disturbances, including slight vibrations, has been estimated at an average of 30,000. To some extent it is possible to foretell the time and place at which earthquakes are likely to occur, as they are likely to be associated with faulting, and, as was demonstrated in the great Japanese earthquake of 1923, are to be anticipated in regions between two zones where there have been recent shocks.

Records are kept of all earthquakes of any appreciable magnitude by means of delicate instruments called seismometers, which record tremors much beyond the limit of human perception. These are liable to respond to vibra-

tions due to any cause. It has been stated that by their means the ground in Italy has been found to vibrate in response to changes in atmospheric pressure, and that a gale in Japan striking a range of mountains will cause the whole island to rock to a very slight degree.

Many large earthquakes have taken place in the last two centuries. One of the largest, at Lisbon in 1755, was submarine, with a focus beneath the Atlantic somewhere near by. It shook an area 4 times the size of Europe, and temporarily raised the sea in the vicinity to a height of 40 ft above ordinary level. The waves formed were detected on the American coast, but the special interest of this disturbance was that it affected inland freshwater lakes as far away as Scandinavia. Loch Lomond rose more than 2 ft.

Two earthquakes representative of widely different types were that of S Italy in 1783, in which the foci were superficial and not confined to the same place throughout the disturbance, and that of Assam in 1897, which was of very deep origin, and had a wide area of maximum intensity in which the ground was much distorted. Possibly the largest area affected by an earthquake was in the Charlestown earthquake of 1886, which was felt over an area of 3,000,000 sq. m from Canada to Cuba.

The greatest damage done by an earthquake was in the Sagami eruption of 1923 in Japan, though the fires which followed the disturbance largely contributed to this. The focus of this earthquake was 30 m. below the Bay of Sagami, and the whole district was slightly twisted about the focal axis. In one place the sea floor was depressed over 400 fathoms, in another it was raised more than 250 fathoms.

Earths, Rare, *see* RARE EARTHS.

Earth-shine, *see* MOON.

Earth-star, a fungus found fairly frequently in wet woods in the S of England, having a ball-like spore-case.

raised on a short stalk with back turned petal like appendages

Earthworm, a common Annelid (q.v.) with a nearly cylindrical elastic body consisting of about 150 short segments each bearing 4 pairs of bristles but no false limbs. Earthworms live in burrows in moist ground usually only coming to the surface at night. They feed upon soil dead leaves or other decaying vegetable and animal matter. They are found in nearly all the warmer parts of the world and over 1000 species are known of which some inhabiting the S hemisphere may reach a length of 4 or 6 ft. By rendering the soil porous with their burrows and by leaving their castings on the surface earthworms are beneficial and they are in no way injurious to farmers and gardeners.

Earwig a small insect sometimes placed in the order *Orthoptera* (q.v.) sometimes in a separate order *Dermaptera*. It has biting mouth parts very short leathery front wings voluminous radially veined hind wings folded beneath them and a pair of defensive nipper at the end of the body. It undergoes no metamorphosis. The name is developed from the Anglo-Saxon *ear* ear and *wege* insect, perhaps with reference to known cases of the insect creeping into the human ear.

Earwigs eat animal and vegetable food and are comparatively harmless although doing a certain amount of damage to blossoms but occasionally they prove a nuisance by invading houses in great numbers. The care with which the female looks after her eggs and young is unusual in insects of this type.

Easel, a stand or support for an artist's canvas generally made of wood. The sketching easel with three adjustable legs and of light weight is used by the artist as a portable easel when working out of doors. The studio easel is of heavier construction and may be designed to hold pictures of all sizes at various heights and angles.

Easement a privilege without profit i.e. a right attached to one piece of land called the *dominant* which allows the owner of the land to use the land of another which is called the *servient* in a particular manner or to restrict the use of it by its owner in a particular manner. Easements include e.g. a right of way a right to light a right to hoot rubbish or erect sign boards. See also PROFIT A PRENDRE.

East, Sir Alfred (1849-1913) British landscape painter born at Kettering before his death he presented a number of his paintings to that town. He began his training at the Glasgow School of Art going later to the École des Beaux Arts in Paris. He was elected R.A. in 1913 and in 1910 he received his knighthood. His landscapes hang in several public galleries abroad including the Luxembourg and in provincial galleries in Britain. They include paintings done in Japan in 1888. He was also an etcher and he wrote *The Art of Landscape Painting in Oil Colour* (1908).

East Africa, see KENYA UGANDA PORTUGUESE E. AFRICA.

East Africa, Campaigns in (1914-18). At the outbreak of war the small forces of the Germans in E. Africa under von Lettow Vorbeck were concentrated while those of the British were scattered. The Germans were able to occupy Tabora from which they could threaten both the Uganda railway and the capital of Kenya Nairobi. The outset of the operations was marked by frequent and successful German raids but the Government of India sent reinforcements in 1915. The British attack opened in Nov. 1915. Attempting to land at Tanga the reinforcements were repulsed and the British re-embarked. After the conquest of German S.W. Africa reinforcements were obtained from the Union of South Africa and in 1916 General Smuts was given chief command. By March he had driven the Germans back and occupied positions covering Taveta. Advances

were made near Lake Tanganyika by the Belgian forces, and slight advances by British forces from Rhodesia. In 1917 the Germans were driven back into Portuguese territory, and, handicapped by lack of ammunition, adopted guerrilla tactics. They held out gallantly until news of the Armistice reached them, whereupon von Lettow-Vorbeck surrendered. See WORLD WAR

East Anglia, one of the old kingdoms (7th-9th cents) into which Anglo-Saxon Britain was divided, comprising Norfolk, Suffolk, and a portion of the Cambridgeshire fens. To-day East Anglia includes the land between the Wash and the Nore. According to Bede, the kingdom took shape early in the 6th cent. It was Christian under Eorpwald, but at his death c. 627 it relapsed into paganism. His brother Sigebert founded a school and a monastery, retiring then to a monastic cell. His brother Egrie took the throne, but Penda of Mercia invaded East Anglia and slew both Sigebert and Egrie. Anna the son of Ene becoming king. Christianity was again adopted. Penda later killed Anna, and Æthelhere, his brother, took command, but was killed assisting the Mercians against the Northumbrians. There is a gap in history after the ecclesiastical division of East Anglia into two bishoprics, Dunwich and Elmham. The next recorded event is the slaying of Æthelbert by Offa of Mercia. For 33 years the kingdom was under the domination of Mercia until Beornwulf was deposed and Egbert of Wessex became ruler. The East Anglian kingdom ended with the death of Edmund in 870, at the hands of the Danes, who assumed control until subdued by Edward the Elder in 921. From this time to Æthelwine (962-992) it is not unlikely that English earls ruled East Anglia.

Eastbourne, well-known S coast holiday resort in Sussex, a few m E of Beachy Head. It is a well-built town with all the usual holiday

amenities. Important Roman remains have been found in the district. Industries are mainly concerned with pleasure catering, but also include boatbuilding and a little fishing. Pop 67,435.

East Dereham, town in mid-Norfolk, the birthplace of George Borrow and the burial-place of the poet Cowper. It has a 12th-cent church, originally that of the nunnery. Cowper's tomb is in the N transept, and visitors are invited to pay their "fond tribute due to Cowper's dust." The Bell Tower of the church (1500) was used at one period to house French prisoners-of-war. Situated as it is in the centre of Norfolk, the chief industry is the manufacture of agricultural implements, the market being devoted to cattle and agricultural produce. Pop 5640.

Easter, the festival commemorating the resurrection of Jesus Christ, observed by all Christian bodies. It takes its name from the Teutonic goddess of spring, Eostre, in other countries the name (e.g. Fr *Pâques*, Sp *Pascua*) is generally derived through the Latin from the Hebrew name of the festival of Passover. Easter is the greatest festival of the Christian Church, and controversy has arisen over its date. This was one of the main differences between the British and Roman Churches in the 8th cent. It is now observed on the 1st Sunday after the first full moon immediately following the vernal equinox.

Easter Island, isolated island of volcanic origin in the Pacific Ocean in the possession of Chile. The island is notable for its huge stone statues, the product of some forgotten people who may have been stopped in their work by a cosmic catastrophe. Several of the statues stand outside the British Museum. Area c. 45 sq m.

Eastern Bengal and Assam, see ASSAM

Eastern Empire, see BYZANTINE EMPIRE

Eastern European Time, see OBSERVATORIES

Eastern Orthodox Church, known officially as the Holy Orthodox Catholic Apostolic Eastern Church often referred to as the Greek Church or as the Orthodox Church one of the three great divisions of Christianity the other two being the Roman Catholic Church and the group of Protestant churches

The schism between East and West was not such a sudden rupture as was the Reformation which split the Christian Church in the West but a fairly long development out of conflicting claims of East and West both in theology and in ecclesiastical organisation Much of the theological controversy from which emerged the characteristic doctrines of Christianity concerning the nature of God and of Christ the doctrine of the Trinity and of the Atonement was carried on in the East under the influence of Greek philosophy while the more barbarian West concerned itself mainly with the practical side of Christianity The East had its roots in Greek philosophy the West in Roman administration and particularly in Roman law Actually the split came along two clearly defined lines The first was a theological question of the doctrine of the Trinity In the Apostles' creed originally there was no mention of the origin of the Holy Ghost In the Constantinopolitan or Nicene creed the words who proceedeth from the Father were placed after Holy Ghost The Church of Rome without the authority of a council added and the Son to these words This is the famous *Filioque* clause To the Greeks this addition made neither with the sanction of an Ecumenical Council nor after consultation with the Eastern Church was in any case theologically inadmissible This procession from both the Father and the Son and its corollary the view that the Holy Ghost was the spirit of both the Father and the Son while satisfying the extreme Western emphasis on the Deity of Christ and His

power to save sinners offended the metaphysically inclined theologians of the East as being a destruction of the symmetry of the Holy Trinity and a confusion between the attributes of the divine Persons

In the second place the Churches of the East objected to the Roman See's claim to hegemony The See of Rome was acknowledged by all to be the first amongst the three patriarchates Rome Antioch and Alexandria but papal claims to greater power were rejected Other matters of difference were the celibacy of the clergy the use of unleavened bread in the Eucharist etc Beneath this there was a fundamental cleavage between the East and the West both in ideology and after the fall of the Western Roman Empire in political organisation After mutual recriminations the break came in 1054 after the excommunication of the Eastern Church by Pope Leo IX Attempts were made in the Middle Ages to bring about a reconciliation but these were always met by the refusal of the Eastern Churches to submit to Papal demands (see LYONS FERRARA and FLORENCE COUNCILS OF) With the fall of Constantinople (1453) all attempts at reconciliation came to an end

The East and the West developed somewhat differently in doctrine ritual and ecclesiastical organisation In doctrine apart from the *Filioque* clause the main differences are that according to the East man in his ante-baptismal state of bias towards sin is not without power to resist evil that the Sacrament of the Eucharist includes the participation by the laity in both elements bread and wine and that while bishops must be celibate priests and deacons need not though they may not marry after taking orders In ritual the main difference lies in the Eastern preservation of older usages and the stress laid on fasting In organisation the Eastern Churches have four patriarchs governing branches of the church—in some cases e.g. pre-War

were made near Lake Tanganyika by the Belgian forces, and slight advances by British forces from Rhodesia. In 1917 the Germans were driven back into Portuguese territory, and, handicapped by lack of ammunition, adopted guerrilla tactics. They held out gallantly until news of the Armistice reached them, whereupon von Lettow-Vorbeck surrendered. See WORLD WAR

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Eastern Bengal and Assam, see ASSAM

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of obtaining dominant influence in Turkey. The Turkish revival later in the 19th cent changed the conditions somewhat. The other great feature of the problem which persisted throughout the whole period was the growth of national feeling on the part of the subject races of Turkey. The Eastern Question is the story both of the rest of the Balkan States and of disputes on the part of the Great Powers over Turkey and this latter feature is one of the strands leading to the outbreak of the Great War.

The Eastern Question may be said to begin with the treaty of Kutchuk Kainardji in 1774 which gave Russia rights of protection over the Christian inhabitants of Turkey. In the treaty of Bucharest of 1812—which Turkey never ratified—Russia definitely undertook the rôle of protector of Christian nationalities subject to the rule of the Sultan. Russia at this time claimed that the Eastern Question was purely her own affair and did not concern the other great Powers. The Congress of Vienna in 1815 did nothing about the Eastern Question and the Sultan was not a member of the Holy Alliance. This seemed to mark the success of the Russian policy, but the Great Powers insisted on holding a conference (the London Conference 1830) to settle the fate of Greece after the Greek War of Independence (1810-9). Henceforth Russia had to take into account the attitude of the Great Powers. By 1830 Serbia had achieved autonomy and Greece complete independence and the Danubian principalities had become practically autonomous.

For the next 10 years Russia experimented with the policy of influencing Turkey and treating her to all intents and purposes as a vassal state. The Treaty of Unkiar-Skelessi in 1833 inaugurated this policy. By this treaty Russia and Turkey formed an alliance and Turkey was to close the Dardanelles against the ships of all countries in time of war.

Turkey was at this time faced with a serious revolt of Mehemet Ali

the Pasha of Egypt while the other Great Powers were exerting all the influence they could to prevent Russian domination of Turkey. The Russian policy failed with the signing of the Treaty of the Dardanelles 1841 which limited the activities of Mehemet Ali to Egypt and closed the Dardanelles to all ships of war unless with the consent of the Sultan.

The Eastern Question was re-awakened by the matter of the Holy Places in 1850. Quarrels between Orthodox (Greek) and Catholics in Palestine caused Napoleon III to demand the revival of an old right of protection over Christians in the Turkish Empire that France had once possessed. Russia demanded a protectorate over all Orthodox Christians in the Sultan's territory. Acting with British advice the Sultan rejected the Russian demand which had been presented as an ultimatum and Russia declared war on Turkey. The question of the Holy Places was only a minor incident; the real cause of the struggle was once more the rivalry of the Great Powers for dominant influence in Turkey. England, France and later (for diplomatic reasons) Piedmont came to the assistance of Turkey and the war was terminated by the Treaty of Paris 1856. By this treaty the Black Sea was neutralised and closed to all vessels of war. Turkey was admitted to the family of European nations and promised in turn better treatment for Christians under Turkish rule. Russian policy was heckled temporarily and Turkish rule given a fresh lease of life. Whether these results justify the suffering and loss of life involved in the war is a matter still disputed. It took place in the Crimea and its chief features included the siege of Sebastopol (see CRIMEAN WAR) and the Charge of the Light Brigade.

By the time that Russia's denunciation of the Black Sea clauses in the Treaty of Paris (1856) occasioned a fresh crisis in the Near East the situation had changed. National feeling in the

Russia, government is by a synod of bishops under the State. Doctrines are proclaimed by synods of patriarchs and bishops, and there is nothing to correspond with the Papacy.

Before the World War the Orthodox Church consisted of the four patriarchates, Constantinople, Antioch, Jerusalem, and Alexandria, of which the last three were weakened in the early history of the Church by the Nestorian and Monophysite (*qqv*) schisms, and several national branches in Cyprus, Russia, Greece, Bulgaria, Rumania, Serbia, and Montenegro, large memberships amongst the Slavs and Rumanians in Austro-Hungary, and the small church of Mount Sinai.

Since the War, conditions have altered considerably, most of the Greek subjects of Turkey have been expelled and repatriated to Greece. The orthodox in Poland-Lithuania have been cut off from the Russian Church to which they belonged. The revolution has resulted in the destruction of ecclesiastical organisation in Russia, whose church is now governed by a synod of bishops meeting outside Russia at Belgrade.

The relations between the Eastern Orthodox Church and the Roman Catholic Church have remained unchanged since the failure of the Council of Florence to reconcile them. But recently the relations with the Protestant churches have been considerably modified. Some of the 16th-cent reformers seemed to have hoped for peace with the East—Melancthon was the leader of this movement, the death of the reformer Cyrillos Lucaris, patriarch of Constantinople and the East, and repudiation of his teaching, quenched all hopes of this. More recently the question has been revived by the Old Catholics (*qv*), and following them the Church of England. The movement began unofficially in Anglo-Catholic circles of the Church of England, and towards the end of the 19th cent the possibility of some sort of understanding was increased by an

official exchange of courtesies, and the formation of a committee under the presidency of the Anglican bishop of Gibraltar to promote friendliness between the Anglican and Eastern Churches. More recently this has been carried farther by the laying down at the Lambeth Conference (*qv*) of a basis for co-operation, the acknowledgment by the Eastern Orthodox Church of the validity of Anglican orders, and by meetings in international conferences at Stockholm and Jerusalem. At the same time there has been a marked movement among certain groups in the Eastern Churches towards submission to Rome.

Eastern Question, The. The problems involved in the presence of the non-Christian Turkish Empire in Europe, and the attitude of other great Powers to this, were known as "The Eastern Question." This term was used as early as the Congress of Verona, 1822, and does not include the very different problems of the Middle and Far East. At that date there were no rival British and Russian influences in Persia to create the question of the Middle East, and the penetration of the Far East by European influence had scarcely begun. The term referred solely to the problems of the Near East, then of overwhelming importance, to-day overshadowed by that of the Far East and of Sino-Japanese jealousies.

In the first part of the 19th cent the problem was conditioned by the apparent decay of the Turkish Empire. Turkey was an unstable element in the European political system, her power was declining, and the question was, what was to take its place? England and Austria wished to bolster up the Turkish Empire in order to check the expansion of Russia, while Russia wished to obtain at least control of the Dardanelles and Bosphorus so as to gain easy access to the Mediterranean Sea. At times Russia's policy seemed to be that of breaking up the Turkish Empire, and at others that

large tracts in Macedonia at the expense of Turkey

But the Eastern Question was not settled. A year later the World War broke out. But even the World War did not settle the question. The Treaty of Sèvres altered the map of the Balkans once more but it was never ratified and was successfully defied by Turkey.

Throughout this period the policy of the Great Powers with regard to the Eastern Question has not been marked by any great degree of understanding or sympathy for the Balkan peoples themselves. The States have gained their independence as the Turkish Empire declined. The Russian policy of the dismemberment of Turkey in face of strong opposition on the part of England and Austria did not bring Russia any nearer her aims but resulted in the establishment of very independent and nationalist States blocking the road to Constantinople. The opposing English policy failed in its means the bolstering up of Turkey but achieved its ends. The granting of Constantinople to Russia under an abortive secret treaty in the early years of the World War is history's comment on the futility of most diplomacy in the Eastern Question. See G. P. Gooch *History of Our Time* chap. V.

East India Company an incorporated company trading with India and the East Indies. East India companies were founded in the 17-18th cent. by many European countries the most important being the English East India Company with a close rival in the Dutch E. I. Company. The English company obtained from Queen Elizabeth in 1600 a charter conferring the monopoly of trade with the East Indies. In 1609 the charter was renewed by James I. In 1618 the company established a factory at Surat (Bombay) and from a very early date the companies' ships reached as far E. as Japan.

Friction between the English and Dutch companies became acute in 1682

on the occasion of the massacre of Amboina (qv) but relations were later adjusted by an unofficial division of the disputed territory the Dutch keeping to the Far East and the English to India.

Early in its career the English E. I. Company had a formidable British rival in the association of the Assada Merchants but in 1637 Cromwell renewed the charter of James I and the E. I. Company bought out its rival. Charles II granted further privileges to such an extent that the powers of sovereignty were virtually delegated to the company. It was empowered to acquire territory and to make war and peace. It had its own army civil service and judiciary. The establishment of the three presidencies of Bombay Madras and Bengal in the late 17th cent. confirmed its status. It continued to administer British India until 1858 between which year and 1858 its powers were gradually transferred to the Crown. Its two most famous servants were Clive and Warren Hastings.

The company's East Indian domination and held a pre-eminence among merchant ships that lasted until the supersession of sail by steam.

East Indies a general term used to describe the whole archipelago that lies between Siam and N. Australia (see separate headings including DUTCH E. INDIES BORNEO PHILIPPINE ISLANDS NEW GUINEA etc.)

Eastlake, Sir Charles Lock (1803-1865) English painter. His artistic talents were early developed by Benjamin Haydon and he also attended the Royal Academy School. His first picture *Christ restoring Life to the Daughter of Jairus* was exhibited in 1813 at the British Institution. He was elected A. R. A. in 1818 R. A. in 1830. He was keeper of the National Gallery (1843-) in 1855 he became director. On becoming President of the Royal Academy in 1850 he was knighted. He published a translation of Goethe's *Theory of Colours* in 1840. *Notable for a History of Oil*

Balkans was growing, and the Pan-Slav and Pan-Islam movements carried in time the seeds of future trouble. In 1875 and 1876 risings took place in Herzegovina and in Bulgaria. These risings were suppressed ruthlessly by the Turks, and the "Bulgarian atrocities" occasioned Gladstone's famous pamphlet denouncing Turkish rule. In 1876 Serbia and Montenegro declared war on Turkey, and Russia followed suit in 1877. The Turks were defeated, and the war was concluded by the Treaty of San Stefano, 1878. Under the terms of this treaty Montenegro, Rumania, and Serbia were to become independent, and Bulgaria, including Macedonia, was to be a self-governing State under the suzerainty of the Sultan. The other Great Powers objected, in accordance with their traditional policy, to the question being settled without their agreement. They insisted on a Congress of European Powers being summoned to discuss what should be done. Russia reluctantly agreed, and a congress was held in Berlin, 1878. The Treaty of Berlin, 1878, altered the provisions of San Stefano with regard to Bulgaria. The territory allotted to Bulgaria under that treaty was divided into three parts: one, Macedonia, was to remain part of Turkey, the other two, Bulgaria proper and E Roumelia, were to be semi-independent States under the Sultan. Austria was to occupy and administer on behalf of Turkey the provinces of Bosnia and Herzegovina. In 1885 E Roumelia and Bulgaria joined forces in one principality, the Powers protesting at this breach of the Treaty of Berlin, but taking no action.

Until 1908 there were few incidents to disturb the peace of E Europe, and these of minor importance. In this year a revolution occurred in Turkey. The Young Turks, a party advocating constitutional government and a programme of reform, seized power, and a new phase in the Eastern Question began. This phase was to

result in the Turk being almost entirely driven out of Europe, only a small territory round Constantinople remaining Turkish at the outbreak of the Great War. Advantage was taken by other nations of internal strife in Turkey. In 1908 Austria annexed the provinces of Bosnia and Herzegovina, to the indignation of the followers of the Pan-Slav movement in Serbia and Russia. Russia was, however, suffering from her defeat in the Russo-Japanese War (qv), and Serbia was too weak to do more than protest vigorously.

In 1911 Italy attacked the Turkish possession of Tripoli, and after a short war with Turkey obtained it under the Treaty of Ouchy, 1912. The military weakness of Turkey was now apparent, and to the surprise of Europe the Balkan States united in a war against Turkey, known as the First Balkan War. In a series of campaigns the different armies of Greeks, Serbians, and Bulgarians were conspicuously successful, and Turkey was defeated. The Great Powers again insisted on having a say in the alteration of the map of the Balkans following the war. Owing to the insistence of the Great Powers on an independent Albania, the previously agreed division of the conquered territory could not be carried out. Serbia was unable to obtain that access to the sea she so desired, and demanded compensations in Macedonia, the greater part of which was to have gone to Bulgaria. This was refused by Bulgaria, which attacked Greece and Serbia in 1913. Rumania took this opportunity of invading Bulgaria, as did the Turks, seeing in their opponents' divisions a chance of recovering some of their lost territory. The Treaty of Bucharest (1913), following the defeat of Bulgaria, laid down the terms of peace. The result was that Bulgaria obtained little or no more territory than she had possessed at the outbreak of the First Balkan War, her gains in the S from Turkey being offset by losses in the N. to Rumania. Greece and Serbia gained

in England and gradually civil courts took over the questions and ecclesiastical jurisdiction became confined to questions of Church discipline.

Ecclesiastical Law The rules and regulations governing the Church of Christianity both internally and in its relations with civil authorities. It is particularly concerned with questions of doctrine and discipline internal to the Church. See also Canon Law.

Ecclesiastical, or the Wisdom of Jesus the Son of David is one of the Apocryphal books. It is a set of ethical maxims after the style of the Proverbs.

Echelon (military), arrangement of troops drawn up in a spiral formation, consisting of a series of parallel lines none of which are in the same line. The term is derived from the French *échelon* (round of a ladder). In the World War British C. H. G. in France and Flanders was divided into First, Second and Third Echelon.

Echinus, also known from the spines on its back and its diet of ants as the porcupine anteater is a mammal of the order *Mammalia* (q.v.). It is related to the duckbill (q.v.) which it resembles in the character of their both have in common with R. In particular in laying and hatching eggs. Echinus are found in New Guinea, Australia and Tasmania but there are only a few distinct kinds. They are terrestrial burrowing animals with a beak like snout no teeth and a long worn like tongue with which they lick up ants. They have the habit of rolling up like hedgehogs thus protecting themselves by means of the spines.

Echinidae see SEA URCHINS.

Echinodermata, or *Echinodermata* a phylum of exclusively marine animals comprising the starfish, sea urchins and others. It is distinguished from the other phyla which also have a distinct body cavity surrounding the alimentary canal by the radial arrangement usually in groups of five of all parts of the body. Echinodermata also as a rule have an exoskeleton of

calcareous plates each composed of a single crystal of calcite and these are sometimes thick and closely fitted together to form an outer casing or shell. The tentacles also form a system of vessels filled with sea water and usually opening to the exterior by a single orifice but internally supplying a series of lateral processes. The foot-like process is called the *podium* which are used for locomotion and feeding.

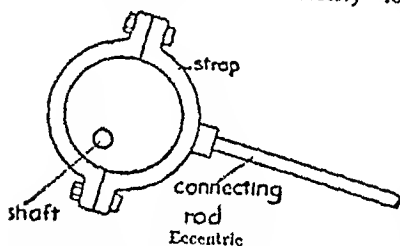
In development most echinodermata pass through a remarkable metamorphosis that nearly has led to their being a laterally or laterally asymmetrical organism which swims freely by means of the arms arranged in bands on projection of the body wall. Sometimes the whole sometimes only part of this larva develops into the adult. Echinodermata are very prolific. It has been calculated that a single sea urchin may lay as many as 70 million eggs in one season. Many echinodermata also have remarkable power of recovery from injuries being able to regrow lost parts.

A common starfish cut in half will in course of time make two complete individuals. The echinodermata are a very ancient group their remains being found in the earliest fossiliferous rock and in the Mesozoic seas they occurred in greater profusion and variety than at the present time.

Echinodermata are divided into two main divisions. The first contains the so-called stalked forms (Stolidozoa) comprising the sea lilies (q.v.). In these the body is usually attached either temporarily or permanently by a jointed stalk rising from the end opposite the mouth which is uppermost and is usually surrounded by numerous tentacles traversed by ciliated grooves along which particles of food are swept into the mouth. An exoskeleton of calcareous plates encases the whole body. To the Pelmatozoa also belong two extinct groups the Crinoids and Blastoids which were important in Palaeozoic times. The members of the second group (the Eleutherozoa) are never stalked and never have the mouth uppermost food

leads any card, and the dealer must follow suit and take the trick if possible, if he can do neither, he may discard any card. Winning 3 or 4 tricks scores 1 point, winning all 5 tricks (the vole) 2 points. Game consists of 5 points.

Eccentric, a mechanical device for turning a rotating motion into a reciprocating motion. It consists of a circular disc rotating about an axis at a greater or less distance from the centre of the disc. Round the disc is a metal strap to which a connecting rod is attached by one end, the other end then having a reciprocating motion when the disc is rotated. The eccentric takes the place of a crank and thus avoids the necessity for



breaking the line of the shaft, but it is unsuitable for replacing the crank as a means of producing a circular drive from a reciprocating part, such as the piston of an engine.

Eccchymosis, in pathology, the collection beneath the skin of blood which has escaped from small vessels. It is usually caused by a bruise (see BRUISES).

Eccles, town on the Irwell, near Manchester, Lancashire, associated with the cotton industry. It specialises in the manufacture of gingham and fustian. Apart from textiles and engineering, the manufacture of machinery associated with the cotton and clothing trades is steadily gaining importance. The currant-jaden Eccles cakes are well known. Pop (1931) 44,415.

Ecclesia, the assembly of all the free citizens of the State in ancient

Athens. This assembly, first called to ratify decisions of the executive, became later the sovereign body. The assembly was guided by a report of the *Boule*, or Council, and proposals made therein were discussed and decisions taken, but any member could initiate legislation, and the Council had in practice little power. The Ecclesia had certain judicial functions, but was not greatly concerned with legislation.

Ecclesiastes, Wisdom book in the Old Testament, noted for its alternating moods of despondency and calm. The book gives an account of the author's attempt to penetrate the mysteries of life, his inevitable bafflement and attitude of negation. The belief in a personal God is weak; the Deity is rather the author of natural laws. It is a book foreign in tone to the rest of the Bible.

Ecclesiastical Commissioners, a body set up in 1836 to administer the revenues of the Church of England. They pay the clergy of all benefices not deriving their income from glebe or tithe-rent charge. They have aided the process of increasing the stipends of the poorer benefices which has been proceeding since the War. The Commissioners comprise the two archbishops, all the bishops, the deans of Canterbury, Westminster, and St Paul's, the Lord Chancellor, the Lord President of the Council, the First Lord of the Treasury, the Chancellor of the Exchequer, one of the principal Secretaries of State, the Lord Chief Justice, the Master of the Rolls, and various lay members of the Church of England duly appointed.

Ecclesiastical Jurisdiction, the power of ecclesiastics over members of the church. Exercised at first over spiritual matters, with the closer union of Church and State in the Middle Ages, the jurisdiction of the ecclesiastical courts extended to many matters to-day treated as civil, e.g. marriage, probate questions, etc. The Statute of Appeals (1533) abolished the right of appeal to the Pope on such questions.

or partial. In the former case the whole disc of the moon passes into the earth's shadow. In the latter it just skims the edge of the shadow and a portion of the disc remains bright. Since the shadow of the earth is actually on the surface of the moon no parallax effect is possible and the eclipse is visible to everyone on earth to whom the moon is visible (i.e. to a whole hemisphere). The position of an observer on the earth does not affect the degree of partiality of a lunar eclipse, nor is it possible to convert a partial eclipse of the moon into a total one by taking up a special station on the earth. Even in total eclipse the moon is seldom completely extinguished but assumes a deep coppery hue owing to the earth's atmosphere bending the sunlight round into its shadow.

Eclipses of the sun like those of the moon may be total or partial. In this case the shadow is on the earth and for an eclipse to be total the observer must be in this shadow; therefore his position on the earth's surface is of paramount importance. The moon is a comparatively small body and its shadow at best is only a few hundred miles across and unless the observer is stationed in the narrow belt of country traversed by the moving shadow he sees only a partial eclipse. Thus a solar eclipse may be total in one place and partial in another while at a local yet farther away still no eclipse at all may be seen.

An annular eclipse of the sun is a special case of the partial eclipse which occurs when the moon although passing centrally across the sun's face is too far away completely to cover it. At mid-eclipse a brilliant ring or annulus of the sun's surface is still visible round the rim of the moon.

Eclipses recur at regular intervals of 18 years 11½ days (10½ days if there are 5 leap years in the interval). This period is named the Saros and was known to the ancient Egyptians.

A total eclipse of the sun is of great popular and scientific interest. The

accompanying phenomena greatly impress even a casual observer while scientifically the few moments of total eclipse are the only opportunities at present open to us to study the sun's corona, a beautifully pearly radiance stretching out from the sun's surface in all directions for hundreds of thousands of miles. See also EARTH SUN.

Ecliptic, see OBLIQUITY OF THE ECLIPTIC

Eclogite rocks of the composition of gabbros (q.v.) but of special mineralogical constitution consisting usually of aegite hornblende garnet and quartz. They are sometimes associated with gneisses and are probably intrusions of basic magma rising from considerable depths and crystallised under stress. Eclogites are found in Scotland especially in Sutherland in Donegal in Norway Saxony Italy and elsewhere on the Continent. The diamonds at Kimberley may have originated from rocks akin to eclogites.

Eclogue strictly a selection but owing to Vergil's *Bucolica* having been given the title *Eclogues* the term has become synonymous with *Bucolica* (q.v.).

Ecology [*from* *ekos* (adj.) (bot.)] The study of the relation between plants and the places in which they grow. On any country walk one can see that the plants met with have not all grown purely by chance in the places where they are found. Some are to be found only at the edges of streams in deep valleys where the air is always moist and others only on the dry and windy ridges. There are flowers of woodland of field and of cliff and mountain. Every plant has one kind of habitat where it grows and flourishes year after year. Ecology is a very wide subject requiring for its study a knowledge of all branches of botany.

The main features of any habitat are physical depending firstly on the geographical position and on the nature of the rocks and soil. Temperature water and light between them control and determine plant life.

Temperature The plants of the

being taken directly into it This group is subdivided into four classes The sea cucumbers (Holothurians) have the body lengthened and traversed from end to end by the alimentary canal, the radial symmetry being obscured

The typical starfishes (*q v*) have marked radial symmetry, and usually five arms passing gradually into the central disc of the body, which contains the mouth The arms are hollow, and contain prolongations of the alimentary canal, as well as other organs

The brittle stars (*q v*) resemble the starfish in their star-like radial symmetry, but the arms are slender, and solid, and spring abruptly from the central disc

The sea urchins (*q v*) are also radially symmetrical, but not star-like, the body being rounded, domed, ovate, or flattened in shape, its organs being encased in a calcareous plated shell usually beset with spines

Echinoidea, *see* ECHINODERMATA

Echinus [EK'INUS], the rounded moulding in the capital of a Doric column, also the rounded moulding between the volutes of an Ionic capital *See also* ORDER

Echo [EK'Ō], in Greek mythology, a wood-nymph who vainly loved Narcissus, calling his name plaintively She pined, and faded away until only her voice was left An echo is the repetition of a sound through reflection of sound waves

Eckhart, Johannes (c. 1255-c 1327), Dominican friar and mystic, born, according to some accounts, in Saxony, according to others, at Strasbourg His attempt to give a speculative basis to theology brought him into conflict with the Church, and he was brought before the Holy Inquisition at Rome Of his life little is known and even the dates of his birth and death are uncertain

Eclairs, to make. Place choux paste in forcing bag with nozzle $\frac{1}{2}$ in in diameter Hold bag obliquely over greased tin Squeeze, allowing end of paste to rest on tin, and gradu-

ally draw the bag away Make the rods 3-3 $\frac{1}{2}$ in in length Place them c 3 in apart Cut off paste close to nozzle Bake in hot oven (450° F, reducing to 325° F) for 30 minutes Make hole and fill with cream mixture from forcing bag Coat with coffee, or chocolate, icing (*see* CAKE DECORATION)

Eclampsia, a name for sudden convulsive seizures usually occurring in pregnant women and due either to Bright's disease, which can only be detected by chemical examination of the urine, or to a peculiarly excitable condition of the nervous system. Eclampsia is extremely dangerous both to mother and child, and may seize an apparently healthy person The best safeguard is to lead a quiet, healthy, and hygienic life

Eclecticism, in philosophy, is a method which selects and then unifies views from various other systems to make a new composite system of thought The practice first appeared in the Stoic school of Greek thought, the most important exponent being Antiochus of Ascalon (1st cent B C) As a result of his teaching the Academy adopted eclecticism instead of scepticism as its ruling principle Cicero was a skilful eclectic who combined Sceptic, Stoic, and Peripatetic doctrines

Of modern eclectics, especially common in France, Victor Cousin is an example Leibniz is another well-known eclectic

Eclipses, phenomena involving the sun, a planet, and its moon, due to the moon obscuring the sun by coming between it and an observer on the planet (*eclipse of the sun*), or to the moon being obscured by passing into the shadow of the planet (*eclipse of the moon*) Such eclipses are constantly occurring in the moon system of Jupiter, and a telescope of even moderate power can show the moons being darkened as they pass into Jupiter's shadow, or the shadow of a moon on the surface of the planet

On earth, eclipses are rarer An eclipse of the moon may be either total

and broken till the fragments again become green and form roofs and grow in the autumn. Many fungi, often of beautiful bright colours, may be found in the autumns in these woods.

Beech Community. Beechwoods are found on chalky soil and are a striking contrast to pinewoods. In spring they have a rich and varied ground flora of anemones, primroses, bluebells, wood orchis, red campion and starwort. This dies down when the leaves are fully expanded and later only in spaces where trees have fallen or been cut are small shrubs and brambles and honeysuckle and sometimes gentians to be found. On the edge of beech woods a rich flora is to be found throughout the year. Usually beech woods and grassland are separated by a belt of scrub of dogwood, service tree, white beam and wild roses and hawthorn with rock rose and blue-purple and rove milkwort and bedstraw among the ground flora.

Oak Communities are found on clay soils. Usually these are mixed woods in which oak is dominant but there are many other trees such as ash, birch, sycamore and a shrub layer of hazel, privet and hawthorn with scrambling plants such as bramble, raspberry and honeysuckle and a considerable ground flora. The latter may include anemones, primroses, bluebells, white campion, the scented woodruff, the pink umbels of wood sanicle, the dioecious dog's mercury, spurge laurel with its curious yellow flower bracts against dark green foliage and the wild geranium or herb robert. Groups of foxgloves are found wherever there is a break in the trees.

Silver Birch Woods form another community characteristic of sandy soil. The ground flora may be rich with spring flowers and these are replaced through the summer by bracken beneath which many minute fungi may be found. The wood sage and fennel are found in June and July.

Chalk Grassland. Occasional haw-

thorns and white beam are characteristic of chalk grasslands and bladder campion, cowslips, white bedstraw and pink centaury.

Sand Grassland. Yellow bedstraw, rock rose, violets or pansies and madder are found.

Heath Community. The heath and heather community is well known on peaty soil which is fairly high up. The community contains heather, bracken, grass and moss with occasionally other flowers such as the parasitic dodder or the insectivorous sundew. Heather grows only in association with certain fungi from which its roots obtain food to add to that dissolved in the soil solution which is usually very poor.

Salt Marsh Plants are usually specially adapted members of many families. The leaves are fleshy and the stems succulent and the roots are capable of absorbing water from strong salt solution. Some plants grow only on salt marshes such as glasswort and saltwort, while others such as Good King Henry (*Sea Pink*) and stock develop a fleshy character and can adapt themselves when they grow on salt marshes.

Aquatic Plants. Many plants live wholly or partly in water. Some have their flowers and part of their foliage above water or floating on the surface and others are wholly submerged. These plants may float freely in the water or be attached to the bottom by roots through a part or all of their lives. Aquatic plants occur among all groups of plants such as the seaweeds and freshwater algae and the water ferns, *Salvinia* and *Azolla* among lower plants and duckweed, mare's tail and the water lily among flowering plants.

Amphibious Plants. Amphibious plants are those living in ground which is generally submerged but is occasionally dry such as *Ranunculus aquatilis* (the water crowfoot), *Isoetes* (celery leaved crowfoot), *Lygonium amphibia* (Amphibious Persicaria) and *Nasturtium amphibium* (yellow

tropical, temperate, and arctic regions are of course distinct from each other, and their mode of life is altogether different. Plants require different temperatures, and some can only grow within a very small range while others can maintain life over a wide range, though they grow best only at a particular temperature. For each plant there is a minimum temperature below which growth does not take place, an optimum at which growth is best, and a maximum beyond which death occurs. Some algae grow and flourish in hot springs, while others grow within the polar regions.

Water is essential for life, and the greater proportion by weight of almost any living organism is water. All regions of the earth do not receive the same rainfall, the greatest is in the equatorial regions, where the rainfall throughout the year is 80-100 in. Then in temperate regions and close to the sea and high mountains, where wet and dry seasons alternate, the annual rainfall is 25-80 in. The rainfall greatly decreases towards the interior of the continents and towards the poles. Three types of vegetation can be distinguished, the first moisture-loving, the second xerophytic or adapted to drought, and another adapted to seasonal alternation of wet and dry conditions. The moisture-loving plants grow, flower, and fruit without any break or resting period. These are the trees, lianas, epiphytes of primitive equatorial forest. The xerophytes variously store water within themselves, are covered with thick waterproof cuticle, and have reduced their surface area to prevent or impede water loss, or else they flourish during the occasional rains and form flower and fruit hastily and die when the next drought begins. The plants prepared for regular seasonal changes cast their leaves at the approach of the dry season, whether it accompanies the hot or cold weather, they shed the flattened blades from whose wide surfaces water is unavoidably lost and cover with

cork the tiny scar left by the fallen leaf stalk, so conserving the water held within the vascular system to maintain the life of the body of the plant till the season again approaches when the water can be replaced and the active vegetative life begins again.

Light Temperature and water supply depend, speaking very broadly, on geographical position or latitude. Light depends more on local conditions, and plants require it because by its energy they combine simple substances into complex food materials and therefore they cannot grow for long in its absence. The structure of the ground and the habit of the other plants mainly allow or prevent the access of light to a plant.

The Plant Community. A plant must be considered as an individual and also as a member of the community in which it grows, all plants are differently constructed, and have different powers of availing themselves of water and light, and prefer or can tolerate different temperatures, and they also modify to some extent all the properties of the habitat in which they grow. If the trees in a wood are cut down, the ground is rapidly covered with quick-growing plants and flowers of all kinds, their seeds were there before, the soil was suitable, probably the earth was damp enough, but the trees had intercepted the light and little if any reached the ground, so that few plants could grow there and probably none could flower.

In England the most important communities are the following

Pine and Fir Community. These trees grow on sandy soil and cast a dense shade so that there is very little undergrowth, and the needle leaves, which are cast when about 5 years old, lie in a thick carpet over the soil and decay only very slowly. The trunks are only scantily clothed with mosses and lichens, and almost the only moss on the ground is *Leucobryum glaucum* whose disc-like bright green tufts dry up and whiten in the summer and lose their roots, so that they are scattered

sophy of society. It does not give a complete account even of that part of human conduct which it studies. The social relations to which business gives rise are the subject-matter not only of economics but also of the science of politics, the study of social action in general and of ethics, the study of conduct in general. In every problem there are two questions: What is? and What ought to be? The problem can only be dealt with when both are answered. Economics is concerned chiefly with the first; the second is (or should be) decided rather by a consideration of the political and ethical aspects of the problem, because our political and ethical opinions give us the ends of our actions.

The purpose of economic study is therefore to discover why certain results follow certain causes to formulate economic laws which explain why in certain conditions business men and financiers are likely to act in a certain way. [Economic laws should not be confused with statutes passed by Parliament. They are merely statements of results generally following given causes e.g. Gresham's Law (q.v.)]. The economist can often foretell the effect of some Government action in the economic sphere or of a crop failure or a new discovery of some important mineral. He can also often recommend a given line of action for he can predict that other things being equal, certain results will follow.

The chief difficulty of economics, as of all social sciences, lies in the fact that the subject is human social life and experiments such as are carried out by the chemist or the physicist are impossible. He cannot try out the action of one factor holding all other factors constant so he has to be most careful in fitting. If the probable causes of a given trend and the best to weigh the respective influence of several causes acting at once. Furthermore, since in the last analysis economic trends are governed largely by what individuals do, the psychological factor is of great importance

while it is always the most difficult to evaluate or predict.

In spite of these difficulties economic science has been able to reveal a number of fundamental laws such as that which states that prices are determined by the relation between supply and demand, that a rise in prices stimulates production while a fall in prices tends to diminish production provided there is no interference by Governments or price maintenance agreements (see WORLD DEPRESSION).

There remain many important problems which are still far from being solved. There are a dozen or more theories of the trade cycle (q.v.) and though many of these have led us to a greater knowledge of the phenomenon a final solution of its causes cannot be said to have been reached.

The importance of the monetary factor in trade cycles and especially in the world depression of the nineteen thirties is another topic on which there is much work being done at present (see WORLD DEPRESSION and QUANTITY THEORY OF MONEY).

Changing conditions make it ever necessary to examine anew the theories and laws which may have been accepted as sound when economic development was in an earlier phase.

Though economics has always been one of the most controversial of sciences it has been so particularly since the World War. This is probably largely due to the revolutionary changes in so many of the basic conditions of the economic world all of which should be taken into account in attacking from both the theoretical and the practical angles the economic problems of the present time.

Economiser a steam boiler accessory comprising a set of tubes through which water circulates and is heated by waste heat usually that contained in the products of combustion of a furnace. Valves are necessary to prevent the deposition in the tubes of ash and soot since these diminish the rate at which heat passes through them. With high boiler pressures the

water-cress) The form of these plants varies according to the degree of moisture

Economics, the study of material welfare—the study of the production and distribution of wealth, or, as Prof Clay, puts it “The study of business in its social aspect, the word ‘business’ being used in its broadest sense, to cover all lawful ways of making a living”

History It is significant that the science was originally called “political economy” The earliest writers to study the subject were chiefly concerned with the fallacies of “mercantilism” Early economic writing was in fact an advocacy of *laissez-faire*, and consisted largely in showing how the individual's desire for wealth led him to do those things which would increase the material welfare of the community—provided the Government did not interfere

Mercantilism was a rather nebulous theory which accompanied the growth of nations out of the era of feudalism into the age of colonisation, the first great expansion of foreign trade, and the development of a money economy It was based on State interference with most lines of economic development Tariffs and subsidies were used to foster a “favourable balance of trade” (*q v*). legislation was passed to develop trade between the colonies and the mother country, while privileged corporations and trading companies were granted monopolies by charter

The early economists became interested in economic laws as the era of capitalism began, and capitalists began to find the restrictions and regulations of the State a hindrance to their activities This school of thought developed from the middle of the 18th cent, its chief exponent being Adam Smith (*q v*) often referred to as “the father of economics” Adam Smith was the founder of what is known as the *classical school of economics* He published his *Wealth of Nations* in 1776, dealing largely with the three factors of production—land, labour, and

capital, and the income derived therefrom—rent, wages, and profits He also expounded the advantages of the division of labour, a question which became of compelling interest as the factory system developed

Later contributions to economic thought were made by Ricardo on rent and wages, by John Stuart Mill, chiefly on the distribution of wealth and the influence of inheritance of property, etc., by Jevons on the law of marginal utility and the determination of value by the relation of supply and demand

Further elaborations were made, notably by Alfred Marshall, Bohm-Bawerk, the Austrian economist, Irving Fisher, and J B Clark in America, and many others

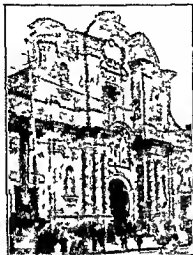
Meanwhile, the Marxist school, the chief exponent of which was Karl Marx, propounded a different theory of value, a theory which implies that injustice is done to labour and which laid the foundation of Socialist doctrine The Marxian theory is that value is determined by the amount of labour put into any given product It further states that labour is purchased by the capitalist at its cost price—the mere subsistence cost of the labourer This is less than the value created by the labourer, the difference being *surplus value* appropriated unjustly by the capitalist by virtue of his ownership of the capital

Modern economics has tended to develop along a number of specialised lines—finance and banking, monetary theory, theories of the trade cycle and business fluctuations, taxation and public finance, labour conditions and wages, price fluctuations, theory of costs, etc

Nature and Scope of Economics Economics is the study of material welfare, and attempts to explain the workings of modern industry, trade, and finance Like other sciences, it should be regarded as a tool, and its limitations should not be forgotten As Prof Henry Clay points out “Economics is not a complete philo-

elected President a Cabinet of 6 Ministers and Congress which consists of two houses the Senate (30 members) and the Chamber of Deputies (56 members). The franchise is open to those of both sexes who can read. In this century the Indians have been granted rights of citizen ship.

History Ecuador was first settled by the Spaniards in the 16th century led by Pizarro the conqueror of Peru.



Old Spanish Cathedral in Quito

During the subsequent Spanish settlement the leaders quarrelled among themselves and Gonzalo Pizarro declared the territory free of Spain. A Spanish Viceroy defeated him and for nearly 30 years the country was ruled from Spain. In the early years of the 19th century the movement against Spanish domination began and in 1822 with the assistance of Bolivar it was successful Ecuador becoming part of the republic of Colombia. In a few years this republic began to dissolve and several of the present departments of Ecuador formed themselves into an independent State (1830) becoming in 1835 the Republica

del Ecuador. Domestic politics have been extremely stormy during the last century there have been nearly 30 Presidents and many successive constitutions.

Eczema or Eczematous

Eczema, an inflammation of the whole skin taking the form of a reddening associated with copious weeping, or discharge of fluid. Any part of the body may be affected and to any extent. Eczema is due to a sensitisation of the skin resembling the sensitisation of the body in *Allergy* (qv) the sensitising agent may be an external irritant or an internal toxin. In fact the skin reactions in allergic people are really eczematous. *Dermatitis* (qv) similar in appearance does not imply sensitisation. External irritants causing eczema include plasters made from the leaves of certain plants, ointments at the anal orifice, scabies and chemicals particularly dyes used by furriers and hairdressers, materials used by photographers and substances handled by grocers and bakers. Of the internal toxins those most frequently causing eczema are associated with liver and kidney diseases, diabetes and gout.

Edda, the title given to two collections of Icelandic traditional literature. The later or Prose Edda was compiled in the 13th century by Snorri Sturluson (qv) and the most complete English translation of this is by A. G. Brodeur (1916). The Elder or Poetic Edda is a collection of poems composed between the years 800 and 1100; an English version is that of H. A. Bellows (1931).

Eddington, Sir Arthur Stanley (b. 1882), English mathematician and astronomer, was Senior Wrangler in 1904 at Trinity College, Cambridge. From 1906 to 1913 he was chief assistant at the Royal Observatory, Greenwich, and then Professor of Astronomy at Cambridge. He has received honours from scientific societies throughout the world for his work on relativity. His early works dealt with stars and stellar evolution, but

temperature of the economiser water rises, and it is necessary to use steel tubes. The corrosion of these is prevented by de-aerating the water (*see* WATER, PURIFICATION OF). Waste heat may be used to preheat the air admitted to the furnace, this is now being done in connection with boiler furnaces, by means similar to those employed in metallurgical furnaces (*q v*).

Ecuador (*Republica del Ecuador*) republic in the NW of S America, bounded N by Colombia, SE by Peru, and W by the Pacific. The boundaries with Peru are not yet clearly defined. Area, c 120,000 sq m. The territory is triangular in shape, the base being along the coast, which is fairly regular, except for the deep inlet at the Gulf of Guayaquil, and several promontories, including Galera, Cape San Lorenzo, and Santa Elena. The large island of Puna lies in the Gulf of Guayaquil, and the Galapagos Islands lying 700 m. W belong to Ecuador.

Relief The country is divided naturally into three regions: the coastal plain, the great mass of the Andes running N to S, sloping steeply to the coast and with the highest peaks in the centre and N, and the Oriente, a great plain watered by several tributaries of the Amazon.

In the Andes, the highest peaks are Cotacachi (16,300 ft), Cayambe (19,000 ft), Antisana (18,500 ft), Cotopaxi (19,500 ft), Chimborazo (20,500 ft), and Sangay (17,500 ft). A number of short and turbulent streams flow from the mountains to the Pacific, but the longer rivers all flow S and SE to the Amazon basin. These include the Curaray, Tigre, Pastaza, Morona, and Napo.

Climate The climate is modified by the mountains, snow-capped most of the year, the plains E and W experience tropical heat, as the Equator passes through the N part of the country. In the interior there is a heavy rainfall, while the coastal plains vary from wet towards the N to dry in the S. These climatic

variations cause the flora of Ecuador to be extremely diverse, there are cacti, ferns, scores of varieties of fruit, the cocoa tree, ivory-nut palm, and canchona. Animals include the monkey, puma, deer, skunk, and various types of bat, including the vampire. Many kinds of reptiles are found, and a particularly rich variety of bird life.

Agriculture Ecuador is principally an agricultural country, its products being divided between the more tropical crops of the N coastal plain, and the temperate crops of the hills and mountain valleys. The former include cocoa, rubber, coffee, sugar, cotton, and rice, the latter cereals, vegetables, fruit, and cattle raising. Cocoa is by far the most valuable export, though coffee is increasing in importance, and efforts are being made to stimulate cotton, sugar, and rice production. Minerals worked are principally petroleum, gold, and silver, while there are considerable deposits of iron, coal, sulphur, and copper not yet exploited. Vast areas of forest cover much of Ecuador and provide valuable commercial woods.

Manufactures, which are not highly developed, arise from agriculture, with the exceptions of mining, panama-hat making, cotton-spinning, sugar-refining, dairy products, leather, brewing, and chocolate-making. The chief towns of Ecuador are Quito, the capital (100,000), Guayaquil (120,000), and Cuenca (40,000).

Races, Religion, Education The population, which at a very rough estimate is 2,600,000, is composed of whites, about one-eighth of the whole, Indians, mixed races, and negroes. There is no State religion, but Roman Catholicism has the greatest following. Elementary education is free and compulsory, there are a fair number of higher schools and a university at the capital.

Communications are being improved, and there is now a reasonable railway mileage, river transport is used in the agricultural areas.

Government is carried on by an

Edentata, an order of Mammals found only in the New World and containing the anteaters armadillos and sloths (q.v.) These animals on the whole of low organisation with some very special features are characterised by the presence in the spinal column of accessory jointing processes on some of the vertebrae and by the deterioration of the dentition the teeth when present having no enamel and the normal series in the front of the mouth being never complete. The existing species are comparatively few in number and of small or medium size but in former times the order was represented by huge beasts larger in many cases than rhinoceroses some of which were contemporaneous with early man in S America. See also **Ground Sloths**.

Edessa (or *Ufa*) vilayet and town in Asia Minor in the centre of a rich agricultural district on the route from Mosul to Aleppo. Cotton is also cultivated. The inhabitants are Kurds and Turks. There is a citadel and the Mosque of Abraham stands at the edge of a pool formed by two springs which gave the town its alternative name of *Callirhoe*. Much of its early history is legendary. Founded or rebuilt by Seleucus c. 300 B.C. it became an independent state 137 A.C. and made a Roman colony by Trajan in A.D. 116. Christianity is said to have been introduced in the 1st cent. In consequence of the strength of the Arans in 36 and 489 its celebrated school of theology was destroyed. Floods and earthquakes have done considerable damage to the town and since its seizure by the Turks in 118⁹ it has lost importance. Since then save for brief periods it has remained under Turkish domination. Pop. 29,100.

Edgar the Peaceful (c. 914-975) King of the English. Succeeded his brother Ladwig (Edwy) 959. Recalled Dunstan from exile making him Archbishop of Canterbury and his chief adviser. Edgar and Dunstan carried out extensive Church reforms

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Edgar Atheling [*pro* A THIELING] (fl. c. 1040-c. 11th) grand nephew and heir of Edward the Confessor. On Edward's death however his claims for some reason were passed over and Harold was made King. Edgar submitted to William I re-elected in 1066 but had to flee to Scotland and later went to Normandy. He established his nephew Edgar on the Scottish throne 1097. He is reputed to have lived to the age of 100.

Edgehill, a high ridge in Warwickshire near the Oxfordshire border the site of the first battle of the English Civil War (Oct. 23, 1642). Here Charles I and the Royalist forces under Prince Rupert encountered the Parliamentary troops led by the Earl of Essex. The royal cavalry on both wings were successful but in the centre the Parliamentarians held firm. Neither side could claim a victory. Each army was c. 20,000 strong.

Edgeworth, Maria (1765-1849) novelist daughter of Richard Lovell Edgeworth a prominent educationist. Her first novel *Castle Rackrent* appeared in 1800. *Leonea* (1806), *Ormond* (1817) and *Helen* (1834) are others. She excelled in dialogue and characterisation but her plots are not well constructed. Hence her style appears to better advantage in short stories of which she published several volumes. *Poplar Tales* (1804) and *Tales from Fashionable Life* (1809 and 1811). Her descriptions of Irish peasants and land-owners appealed greatly to her readers and the moral lessons which she always drove home endeared her to the serious.

Edinburgh, capital of Scotland situated on the Firth of Forth in Midlothian and including the manufacturing port of Leith and several villages in the locality. Edinburgh has long been celebrated for its magnificent public buildings historical asso-

he is better known as the author of papers dealing with relativity—*eg*



Sir Arthur Stanley Eddington

Space, Time, and Gravitation (1920), *The Mathematical Theory of Relativity* (1923), *Science and the Unseen World* (1929), and others

Eddy, Mrs Mary Baker (1821-1910), the founder of Christian Science (*qv*). As a young woman she devoted much of her time to study, and after numerous experiments discovered what she considered to be the true principles of Christ's healing. This "discovery" took place in 1866, and is explained in her textbook, *Science and Health* (1875). In 1881 she opened the Massachusetts Metaphysical Church, and also acted as Pastor of the first established Church of Christ, Scientist. Mrs Eddy, who was married three times, left an estate valued at \$2 millions.

Eddystone, lighthouse on a dangerous narrow rock 14 m SW of Plymouth. The first building was destroyed in 1703 during a terrible storm, a second lighthouse was burnt down in 1755. The third was dismantled owing to a fissure in the rock rendering it insecure. The present building, by Sir James

Douglas, which was completed in 1882, is of granite, the tower rising 168 ft high, with a lighting throw of *c.* 18 m.

Edelweiss [*A'DELVIS*], a small rosette plant with narrow leaves covered with long, white, silky hairs, and white flowers, belonging to the family Compositae. It grows widely in the Swiss Alps and is a favourite rock plant in England.

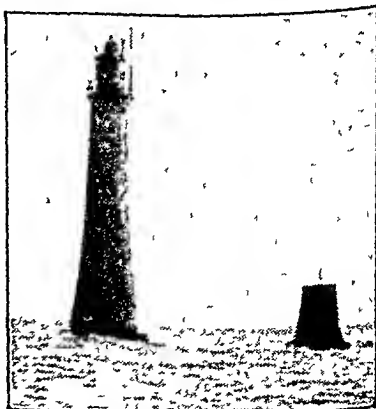
Eden, Garden of, the place where, according to the Bible, man was created and dwelt happily and in innocence before the fall of man (*qv*). It contained the tree of knowledge and the tree of life. The site of the garden is thought to have been N of Babylon where, according to a local tradition, the garden of the gods was located.

Eden Hall, Luck of, an ancient drinking cup belonging to the Musgraves of Eden Hall, Cumberland. Legend states that an ancestor captured the cup from the king of the fairies, who allowed him to keep it on the one condition inscribed on the cup, thus—

When this cup shall break or fall,

Farewell the luck of Eden Hall

It is the subject of a poem by Longfellow, and a ballad by the Duke of Wharton.



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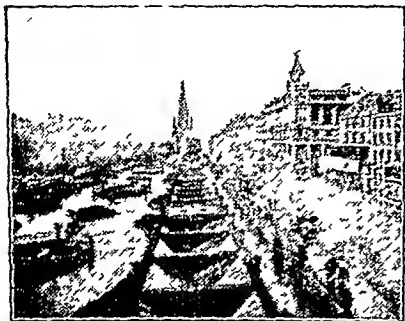
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ciations, and notable educational institutions. The city itself is mainly residential, most of the trade being



By courtesy L. V. S. Railway

Princes Street, Edinburgh

carried on at Leith. Among its buildings are the ancient castle, with its 11th-cent chapel, which includes the rooms occupied by Mary Queen of Scots, the birthplace of James IV, the Scottish Regalia, and the historic armoury. Holyrood Palace, founded originally in the 12th cent as an abbey, is rich in historical associations, and has been occupied by Charles X of France, George IV, Queen Victoria, and their present Majesties. The more modern portions date from the 17th cent. The Palace was the scene of the murder of Rizzio, secretary of Mary Queen of Scots. The University and Medical School are of European reputation, and the Academy and Fettes College are worthy of mention, as are the Observatory, Royal Institution, Parliament House (now the Law Courts), the Advocates' Library, and the National Library of Scotland, which is legally entitled to a copy of every book published in Great Britain. The Royal Scottish Academy and the National Gallery possess many valuable pictures. Churches include St Giles's Cathedral (Presbyterian), St Andrew's, St Mary's Cathedral, and St George's. There are many well-laid-out parks and gardens, including the Zoological and Botanical Gardens. There are several historic castles in the

neighbourhood of Edinburgh, and among the many notable monuments is John Knox's house. Princes Street is considered one of the most beautiful streets in the world.

Leith, which is an important port, manufactures iron and steel goods, paper, and chemicals. There are engineering and sugar-refining works, and flour-mills. Edinburgh has always been noted for printing and publishing, insurance, banking, general commerce, and brewing are also widely carried on.

The city dates from before the Roman period, and was founded around a fortress, the Gaels called it Duncdin, and their kings, as well as the subsequent Scottish kings, frequently lived there. It became the official capital in the 15th cent, and James II and III held most of their parliaments here. Its literary associations are long and famous, the names of Smollett, Burns, Scott, Blackwood, and Chambers may be mentioned, as well as its two most



St Giles Cathedral, Edinburgh

famous periodicals, the *Edinburgh Review* (1802-1929) and the daily *Scotsman* (founded 1817). Pop. (1931) 440,000.

Edinburgh Review, The, one of the famous British periodicals which appeared at the beginning of the 19th cent. It was founded in 1802 by Francis Jeffrey and Sydney Smith, among others, and came to an end in 1929. Its politics were Whig, and its criticism, though unimaginative and

often unfairly destructive was at least honest for the most part

Edison, Thomas Alva (1847-1931) American inventor of Scottish and Dutch parentage. He became a news boy at the age of 12 and later printed and issued the first railway train newspaper. He learned the first principles of electricity and telegraphy on the basis of most of his inventions



Thomas Ed.

from a station master. At the age of 9 he established his own works at Menlo Park New Jersey and embarked on his inventive career. His patents include those for duplex and quadruplex telegraphy, the carbon telephone transmitter and the printing telegraph tape machine. He made the preliminary experiments for the invention of the wireless thermionic valve and applied wireless transmission and reception to moving trains. He invented the phonograph, the incandescent electric light bulb, the kinoscope (or forerunner of the cinema) and many hundreds of mechanical and electrical devices. He is commonly regarded in the United States not only as the father of 20th-century mechanical civilisation but also as the beau idéal of the self-made man. For a large part of his life he was deaf.

Edmonton (1) Capital of Alberta on the N Saskatchewan R. Canada. The chief occupations are coal mining, ranching and lumbering. In the city are saw mills, seal meat packing factories and iron foundries. It is also the seat of a university. Pop. (1931) 78,800. **(2)** Town in the county of Middlesex, England. The chief industries are the manufacture of small arms, ammunition, varnish, bricks and a considerable tomato culture. Three great names in litera-

ture are associated with Edmonton—Heats, Cowper and Lamb. The last named is buried here. Pop. (1931) 77,655.

Edmund St. (c. 841-80) King of East Angles, took the throne 855. He was defeated and slain by the Danes at Hoxne and revered as a martyr, his shrine being set up at Bury St. Edmunds, which takes its name from him. Day Nov. 6.

Edmund (Rich.) St. (c. 1100-140) taught theology and philosophy at Oxford and became Archbishop of Canterbury in 1134. He rebuked Henry III. for his policy but actually played little part in the troubles of his reign. He is noted more for his personal virtue than for capacity in public affairs. He was canonised in 147.

Edmund I, King of the English (d. 946) fought with Athelstan against the Danes at Brunanburh and succeeded him 940. Made peace with Olaf, king of Northumbria but expelled him from England 940 and ravaged Strathclyde. Was slain by a banished robber.

Edmund II, Ironside, King of the English (c. 988-1016) resisted Canute's invasion of England 1015 but was forced back to London. On Ethelred's death in 1016 both became rivals to the English crown and after several battles they made peace at Olney. Canute taking the N. of England and Edmund the S. and dying shortly after.

Education, The History of. The ideals and methods of educational systems have differed according to the various civilisations which have evolved them. In ancient Greece the ideal was the State and the educative process stressed the physical rather than the mental. The most extreme example of this form of education was afforded by Sparta, where physical development, soldierly discipline and a military outlook were the primary aims and intellectual pursuits a secondary consideration. In Athens the training of body and of mind were regarded as of

equal importance Education was less collective and more individual, and in later years intellectual studies took precedence of physical training The Greek system generally was carried out by three kinds of teachers, to whom boys were sent until they reached the age of 17 and became *epheboi* those who taught reading, writing, and arithmetic, those who taught music, and those who were responsible for purely athletic training The State was responsible for the education of these youths but the private institutions of the philosophers were eventually also taken over thus the "University" of Athens was born The Spartan system of education, being based on the conception of a military state, was entirely different

Greek culture had an important influence on Roman education The early Roman republic charged the family, not schools, with the education of its youth The influence was moral rather than intellectual, the result being not so much the development of the mind as the moulding of character But, with the infiltration of Greek culture, professional teaching displaced parental Schools with Greek masters were founded, and literature, philosophy, and rhetoric were studied With the dawn of Christianity, this pagan culture became suspect, though it was retained in most of the Christian educational institutions after its suitability had been exhaustively debated by the early Fathers The ascendancy of the barbarians, however, and the coming of the Dark Ages extinguished all culture which was not preserved by the monastic orders Outside the monasteries, a state of cultural gloom persisted until in the 8th cent., Alcuin, with Charlemagne's approval, founded his famous Palace School and, by his educational treatises and organisation, provided a valuable stimulus to the overduo revival of culture This revival was furthered by European communication with Eastern civilisation, brought about by trading expe-

ditions and the holy wars, and resulted in the formation of the universities By the 13th cent universities existed at Paris, Oxford, Cambridge, and Bologna (founded in the 11th cent), where higher education was available at the hands of the finest scholars of the day As the Middle Ages advanced not only universities, but institutions for more elementary education multiplied The Church, which had a close affinity with the universities, also supported grammar schools, and the monasteries and guilds likewise maintained scholastic institutions This mediæval system, though admirable in many ways, was responsible for the bias in favour of theology and the prejudice against the pagan classics But Latin and Greek literature came into their own again with the Italian Renaissance, and by the end of the 14th cent such scholars as Petrarch had stimulated a revival of interest in the classical works which spread through the educational institutions of Italy and, later, of the rest of Europe The Italian humanists such as Vittorino da Feltre (1378-1446) and other great schoolmasters proved that on a basis of classical study their theories could produce a cultured individual with essentially Christian principles Later propagators of this enlightened spirit in education were Erasmus (1467-1536) and, in England, Colet, who founded St Paul's School in the early 16th cent With the exception of the period of the Reformation, when the universities were denounced by the Protestant reformers, and education languished in an air thick with theological argument, humanism, as interpreted by Melancthon (1497-1560), was for more than two hundred years propagated in schools, Latin being regarded as the most important subject The Jesuit schools which were founded in the middle of the 16th cent. were no exception to this rule The preoccupation with Latin which had been so strongly advocated by the later humanists proved the

rock on which scholasticism nearly foundered in the 17th cent. In spite of repeated agitation for the introduction of vernacular teaching and a general broadening of outlook the schools and universities refused to adjust their curricula to the requirements of daily existence with the result that they failed to an ever increasing extent to attract pupils.

By the 18th cent the universities had improved their position by embracing new ideas and subjects but higher education had become a privilege of an aristocratic minority. But though education had become so lamentably insufficient in practice ideas which were of great importance psychologically were advanced by famous theorists. Rousseau (1712-1778) in his *Emile* formulated the principle that the natural disposition of a child should govern and not be governed by the educational method. Pestalozzi (1746-1827) also advocated the importance of recognising a child's individuality and Froebel (1782-1852) elaborated a similar theory into a detailed method based on guidance, non-interference and natural self-expression. These theorists together with Herbart's (1776-1841) are the most striking examples of the 18th-cent preoccupation with educational ideas. But elementary education itself in England and Wales was still very much in its infancy. In 1829 the Society for Promoting Christian Knowledge had been founded whose object was the establishment of charity schools for the elementary education of boys and girls. These and other schools equally inadequate but supported by different religious denominations together with the later Sunday schools represented the elementary educational facilities of the 18th cent.

Early in the 19th cent the voluntary societies such as the British and Foreign School Society and the National Society for Promoting the Education of the Poor in the Principles of the Established Church arose which

under the leadership of Lancaster and Bell respectively made striking progress particularly in the case of the National Society. The year 1833 is an important one in the history of education for in that year the first Government grant of £ 0 000 for the building of schools was placed at the disposal of the two societies. Six years later a Committee of the Privy Council on Education was set up whose function was the administration of the annual grants while the inspection of schools was for the first time stipulated. It was about this time also that the original teachers training college was founded at Battersea and in 1833 the Committee of Council became the Department of Education. The annual grant had now enormously exceeded its original modest figure and in 1858 a royal commission was appointed to report on the condition of elementary education. The report was completed in 1861 and its most important consequence was the Revised Code by which the issue of grants as determined by the system of payment by results, i.e. the amount of the grant was proportionate to the success or otherwise of the pupils in individual examination. The next highly important development was Forster's Act of 1870 by which school boards were to be established in those districts having insufficient school accommodation and non-denominational religious instruction was strictly prohibited and attendance could be made compulsory by the school boards. In 1880 compulsory attendance became the law of the country.

In 1890 the grant became affected by the average attendance and in the following year free education was made available to all children up to the age of 14. The greatest development however since 1870 came in 1901 with the introduction of the Education Act. By this Act school boards were abolished and elementary schools came under the authority of urban district borough or county councils. Secondary

education of both "provided" and "non-provided" (formerly board and voluntary) schools was controlled by these councils, and the setting up of boards of managers for both kinds of schools became compulsory. These and other provisions relating to the management of schools, and the selection and efficiency of their staffs, were the main features of a comprehensive and far-reaching piece of legislation. In 1906 the local authorities were empowered to provide free meals for deserving cases, and in 1907 medical inspection of all pupils in elementary schools became another of their duties.

The Education Act of 1918 introduced another series of momentous changes. Local authorities were asked to draw up schemes outlining measures to be taken towards a national system of education for everyone capable of profiting thereby, compulsory school age was raised from 12 to 14, and the local authority empowered to raise it, if desired, to 16, part-time attendance was prohibited, nursery schools were to be introduced, with central schools for more intelligent pupils, compulsory part-time education for young people between the ages of 14 and 18 was initiated, though this was afterwards postponed, and attention drawn to the desirability of adequate physical training. The day continuation schools whose establishment the Act had made possible were started by the local authorities in various places, but in 1923 the economic depression and complications as to their administration caused them to be closed. In 1920 the circumstances of teachers were improved by the adoption of the Burnham scale of salaries.

In 1901 the State secondary education, as represented by the greatest of the public schools, was made the subject of a commission whose report led to the reforms effected by the Public Schools Act (1904). The Schools Enquiry Commission probed deeper and brought to the surface many irregularities and shortcomings in the

administration of endowments, which the Endowed Schools Act of 1869 had done much to rectify. By the Technical Instruction Act of 1889 the local councils were able to levy a rate to support technical or manual instruction, and by 1899 technical instruction (later interpreted as including mathematics, science, and modern languages) became until just before the War one of the objects to which contributions to local authorities in respect of beer and spirit duties could be devoted. In 1899 the control over the endowed secondary schools, entrusted to the Charity Commissioners in 1874, was transferred to the newly-established Board of Education, and with the Act of 1902 secondary education took a big step forward. In 1907 the grants from the Board were considerably increased, and at the present time the quality and quantity of the secondary schools show a remarkable improvement on conditions at the beginning of the century.

One beneficial feature of such schools is the considerable proportion of free places available for pupils from elementary public schools. The examinations by which the capabilities of the pupils of these schools are determined include the Oxford and Cambridge Locals in connection with which junior, senior, and honour certificates are issued, and the examinations by which certificates are granted exempting successful candidates from the university matriculation examinations. In Scotland, where, since 1885, a separate Education Department has been in charge of educational affairs, the leaving certificate system has been in force since 1888. In Ireland secondary education is closely bound up with religion, most of the schools in the Irish Free State being connected with religious orders. In N. Ireland education has been locally controlled since 1927. In Wales the national system of education dates from 1889, when education committees were set up which, after the Act of 1902, were

abolished in favour of local education authorities. In 1907 the Welsh Department of the Board of Education was founded. A feature of the Scottish educational system is the larger preponderance of day secondary schools as compared with England where boarding schools are much more numerous. In 190 the school boards were discontinued and burgh and county education authorities took their place. The various bursaries administered by these authorities greatly increase the facilities for free secondary education. Co-education is more general in Scotland than in England where the wide pread girls and boys boarding school system continues to flourish. The present-day experimental methods of education include the Dalton and Montessori systems (qqv) which aim at developing the intelligence and reasoning capacity by encouraging the pupils to take an active part in their own instruction. By the *fre* method pupils choose their own subjects without any persuasion or compulsion from their elders. Such methods will be more than justified in addition to producing a person

Adult Education World Association for Adult Education National Society of Art Masters Association of Assistant Mistresses London Child Study Society National Education Association Association of Directors and Secretaries for Education Association of Education Commissioners Federation of Education Committees (Wales and Monmouthshire) Education Committee of County Councils Association Education Guild Educational Institute of Scotland Educational Settlements Association Froebel Society and Junior Schools Association National Froebel Union International Educational Society National Adult School Union New Education League Nursing School Association Newmarket Britain Parents Association of Great Britain Parents National Educational League Secular Education League National Union of Teachers Royal Society of Teachers Association of Teachers in Technical Institutions League of Women Teachers Educational League Workers Educational League

tion as "a transmission of life through the living to the living." I have said myself that "the ideal object of education is that we should learn all that it concerns us to know, in order that thereby we may become all that it concerns us to be." This implies that the knowledge of facts is only a means to the knowledge of values, values being facts apprehended in their relation to each other, and to ourselves. The wise man is the man who knows the relative values of things. Our experience should, if possible, be grouped round some central conviction, embodying what we might call, in rather stilted language, our philosophy of life. We want to know the world, or that corner of it in which our lot is cast, in order that we may give and receive the best value for our sojourn in it.

It is now generally admitted that the work of the educator is less to impart facts, which, when isolated from their significance for life as a whole, are dead things, or to inculcate opinions which he himself, or those whom he represents, think desirable, than to bring out and realise the latent capacities in the mind of the pupil. The teacher, like Socrates, aims at being the "midwife" of the young mind. He would gladly make his own the words of Sainte Beuve: "As time goes on, you will make me believe that I can for my part be of some use to you. With the generosity of your age you will repay me, in that feeling alone, for more than I shall be able to give you in intellectual freedom, in literary thought. If in one sense I bestow upon you some of my experience, you will requite me, and in a more profitable manner, by the sight of your ardour for what is noble, you will accustom me to turn oftener and more willingly towards the future in your company. You will teach me again to hope." This strikes the right note. The teacher aims at making himself no longer necessary, because it is a lighted torch that he has to hand on to younger and fresher runners. When Bryce says that the

chief aim of education is to stimulate curiosity, he enunciates a psychological truth and brings to light the main difference between the modern and the medieval view of life. "Turpis curiositas est," says St. Thomas à Kempis. For us the thirst for knowledge is better than knowledge itself.

Education, from the point of view of the State, is a training for citizenship. But citizenship is a much wider word than politics. It is, as Burke said in a famous passage a partnership in all science and art and in every virtue and perfection. And he adds, in never-to-be-forgotten words, "as the ends of such a partnership cannot be obtained in many generations, it becomes a partnership not only between those who are living, but between those who are living, those who are dead, and those who are to be born." National solidarity means more than the cessation of sectional disloyalties. It means solidarity between tradition, present conditions, and future hopes. Those only can be entrusted with the direction of the future of a nation to whom her past is dear. The unborn have no votes, but they have interests, which are in our keeping.

In this article attention will be given mainly to education in our own country. The conditions on the Continent and in America are so different that it would be difficult to describe other educational systems without exceeding the space allowed me. In England the system has grown; in other countries it has been made. In consequence, England presents, as an American student has said, a far greater variety of types than any other country, and anomalies which would not be tolerated in France, for example, or in Germany. This variety and elasticity are probably an advantage, or capable of being made an advantage. They are certainly in accordance with the character and traditions of our country, which has never taken kindly to cast-iron regimentation. Since the power of tradition has been and still is so great, it may be worth while to give a very

brief summary of State action in education in England beginning with the 16th cent. though much might be said of educational ideals and practice in the Middle Ages.

The Reformation destroyed most of the educational machinery all of it under ecclesiastical control of the Middle Ages. The grammar schools founded all over England in the 16th cent. were intended to make good this loss. Some of these were new but the majority took the place of the chantry schools suppressed by Henry VIII and Edward VI. Winchester and Eton were then included among the grammar schools. In the reign of Elizabeth grants were made for the maintenance of a few necessitous scholars at Oxford and Cambridge and articles of visitation showed great solicitude both by the Crown and the Church that education should be efficient. The Statute of Apprentices (1562) provided compulsory instruction in arts and crafts for both sexes specially exempting students or scholars in schools or universities. Cromwell in spite of the ardent royalism of Oxford and Cambridge allowed a grant of £ 000 a year to increase the stipends of the Heads of colleges. The Act of Uniformity (1662) gave privileges to the Universities and when James II attacked their liberties the whole country rose to protect them. But university education was at a very low ebb all through the 18th cent. Adam Smith in 1776 says that at Oxford the greater part of the public professors have for these many years given up even the pretence of teaching.

It is interesting to observe that State aid for education and grants for poor scholars are no new principle in England. But the most characteristic feature in the history of English education is the importance of voluntary effort in which the Society for the Promotion of Christian Knowledge founded at the end of the 17th cent. deserves special mention. The names of Andrew Bell and Joseph Lancaster are memorable for their efforts to

promote primary education. The unfortunate disputes about denominational and undenominational schools date from this period and were doubtless inevitable. The intervention of Parliament was only a question of time.

The first compulsory education Act was passed in 1801 in spite of the protests of the employers of child labour in the N. counties. The attitude of the slave-drivers of young children does them no credit but they were able partially to frustrate the intentions of the Act.

In 1833 a small sum of £20 000 was voted for education and was opposed by the demagogue William Cobbett on the curious ground that the effect of education was to make men more immoral and that it increased the number of school teachers—that new race of idlers. To tax the people for education was a French idea and therefore bad. The demand for education among the poorer classes was in fact rather belated in this country; it had to be stimulated from above and in fact to be created by giving instalments of reform which had the effect of whetting the appetite of those who benefited by them. The Elementary Education Bill of 1870 which admitted the necessity of State training and set up School Boards was considered almost revolutionary. In 1880 attendance was made compulsory in voluntary schools and in 1891 school fees were abolished in the great majority of schools reduced in most of the remainder. In 1900 primary secondary and higher schools were brought under the control of a single authority. Since then greater attention has been given to continuation schools and scholarships often of much higher value than were ever given under the competitive system by the Oxford and Cambridge Colleges are bestowed on promising pupils in the Council schools to enable them to finish their education at the old universities. At the present time nearly all students at Oxford and Cambridge are subsidised in one way or

intelligence among those who remain manual workers. The evil becomes greater when the ablest sons of the working men are drafted into a sterile class which does not keep up its numbers. The lowest birth-rates in Great Britain are those of the doctors, clergy, and teachers. Even those whose political prejudices blind them to the fact that the old professional families are on an average an exceptionally well-endowed class, physically and mentally, cannot be indifferent to the sterilising of the ablest children of the manual worker. "We are skimming off the cream of the population in each generation, and throwing it away," writes Dr Schiller.

To this we may answer that the assumption by the State of the burden of giving a good education to all the children who are born must logically carry with it the right of the State to exercise some control over the numbers and over the quality of the next generation. It is intolerable that a pair of slum parents should claim the right to burden their neighbours with the nurture of a dozen diseased or half-witted children. Eugenic legislation will be forced on the modern State, though perhaps not till it is too late. Secondly, the birth-rate among the superior working class is now almost as low as in the learned professions, so that the nation does not lose much by putting the son of a skilled artisan into a black coat. In fact, in Scandinavia and Holland, and I think now also in Germany, the differential birth-rate against the learned professions has ceased to operate. The same may soon be true of our own country, especially if the professional man gives up the struggle to send his sons to expensive schools.

In appointing teachers, now that the supply, especially of competent mistresses, is so abundant, the State would be wise to cease to choose unmarried women by preference. The teachers tend to be a class by themselves, perhaps insufficiently respected socially, and many of the unmarried women

suffer from the psychical malaise caused by living otherwise than as Nature intended. The consequence is that many of them adopt bitter and subversive opinions, with which they sometimes inoculate their pupils. Other things being equal, married teachers should be preferred, for the sake of the children.

It has been said that English education shows more diversity than that of any other country. Of this there is no stronger example than the Public Schools, an institution to which there is no parallel elsewhere. They retain their independence of the State, so long as they are able to dispense with State aid. A few years ago I was criticised for my pessimism by more than one head master, because I said that I thought it doubtful if most of our Public Schools could survive till the end of the present century. I think most head masters now realise that I was right. The boom in these schools has given place to a slump. Some well-established Public Schools have already lost 20 per cent of their numbers, and the governing bodies of others do not disguise their apprehensions. If these proud institutions are once forced to accept Government grants, their doom is sealed. They will become continuation schools for the counties in which they stand.

No institutions are more open to criticism, and none receive such enthusiastic loyalty and affection from those who know them from inside. Continental educationists recognise this, and also that these schools are the chief nursery of certain traditions which they admire in our national character. The uprightness, honour, and "fair play" which belong to the ideal of an English gentleman are nowhere better taught than at the Public Schools. They are not only the ethics of a ruling class, successful attempts are being made to introduce the Public School spirit into the great day schools, supported by public money, which already play a very important part in English education. Those who have

inspected some of these admirable schools must feel hopeful that even if social changes make the position of schools like Eton Harrow and Winchester untenable much of what is best in them may be saved.

Already the Public Schools have been obliged to enlarge and rationalise their strangely narrow and unintelligent curriculum. The ideals of the Renaissance sensible and enlightened enough in an age which really had to go to school to learn the classics were caricatured in the English schools of the 18th and 19th cents. The boys of the Renaissance were trained in the use of arms in hunting husbandry and music our boys till lately were merely taught games the study of the classics degenerated into minute linguistic teaching of stupefying dullness. In the battle between the Greeks and the Trojans the defenders of classical education threw away a good case by their unintelligent advocacy. The result is that Greek which is really better worth studying than Latin has been crowded out of many schools by subjects which only seem to be more interesting or more useful.

For lads in a less fortunate social position continuation schools for adolescents are provided. A difficult question is whether they should be made compulsory as they are in Germany. Compulsion is repugnant to English ideas and would be difficult to enforce on lads who are earning their own living. On the other hand without compulsion comparatively few have resolution enough to undertake voluntary work for improving their minds after regular working hours and it is said that some employers discourage the practice wishing to keep the minds and bodies of their employees fresh for the work which they are paid for. It is possible that these Instruction Classes are less necessary than they used to be. We have to remember that there are now many new aids to self-improvement outside State education. The printed

book has made the oral lecture partly obsolete the cinema is already of educational value and might be made much more useful. Broadening provides nearly all the instruments of culture—music art science literature philosophy and religion. On the whole we may perhaps think that in England compulsion to attend classes is not advisable.

The psychology of education has made great strides to the immense advantage of the pupils who until comparatively lately were subjected to a discipline as stupid as it was brutal. It is now recognised that what the normal child desires is to talk and listen to act (dramatically) to draw paint and model to dance and sing to know the why of things to make things for himself. It is also known that memorising comes naturally to the young boy or girl who should be made to learn by heart things which he will remember for life. After 18 cramming is injurious the young man should be encouraged to think.

This study of psychology has revolutionised education and among other things has taught educators that to cultivate hobbies which can be followed out of school and to use leisure happily and properly is a great part of education. In a good school every opportunity is given for arts and craft for carpentering modelling drawing and painting. Sometimes the boys are taught how to build a shed or cricket pavilion or such skilled work as printing and etching is encouraged. These pursuits should when possible be social playing the piano is a good example of an art which is not suitable for a school.

But the encouragement of hobbies is only part of what will more and more be recognised as an important part of education. We might almost say that the object of education is to train the pupil to enjoy the right things, in order that in after life he may make a good use of his leisure.

soul is dyed the colour of its leisure thoughts, and now that in most occupations the hours of work are shorter than they used to be, and may in the future be shorter still, it is essential that education should be a training, not only for work, but for play. In a machine age, work for wages must tend to be monotonous and somewhat trying to the nerves. But we hope that in the future every worker will have some hours each day at his own disposal. How can he spend them best? The school must kindle intelligent intellectual interests, it must open the door to the inexhaustible treasure of truth and beauty which is ready for all who seek it, it must, in a word, help the pupil to be a civilised man or woman. And when we consider the multiplicity of legitimate interests, and the great varieties of human endowment, this object cannot be attained without more elasticity in the curriculum than it is easy to arrange. There are difficulties, but unless they are surmounted, State education is not doing all that is now rightly demanded of it.

This consideration reminds us naturally of one of the pitfalls of State education—the danger of standardisation, the danger of trammelling the teacher by rigid regulations and innumerable forms to fill up, the danger of sacrificing education for examinations. The objections to testing work by "results" are already recognised. The "riddling Sphinx," as Seeley called the examination system, is responsible for much of the comparative failure of our education. In almost every examination it would be possible, as Professor Bateson says, "to extract question after question that ought never to have been set, referring to things that need never have been taught, and knowledge that no one but a pedant would dream of carrying in his head for a week." To swallow gobbets of raw information to be presently disgorged in the same condition at an examination, is not

education. The pupil very properly protects himself by forgetting at the earliest opportunity all the useless facts with which his memory has been loaded. Nevertheless, it is useless to fulminate against examinations, or to suggest that they might be abolished with advantage. No method of estimating proficiency by viva voce talks or intelligence tests can take the place of written examinations. They stimulate a healthy competition, without which industry would languish. "Without examinations," Bishop Creighton wrote, "there would be a tendency to idleness and laxity, and teachers would not be kept up to the mark. The evil side of examinations is that, while they were simply meant to be tests, teachers will insist upon regarding them as standards. They try to circumvent the inspector, treating him as if he were a foe instead of a friend." Those who really believe in education will not willingly behave so, but great care must be taken not to put pressure on the teachers "to seem rather than to be," as the Greeks used to say.

I have left till the last the vexed and vexatious question of religious teaching in schools. Education has in the past owed so much to the Churches that it would be ungrateful to show impatience at their claims, and yet it cannot be denied that much of the zeal exhibited by ecclesiastics has arisen from the desire that the children shall be grounded in the tenets of the Church to which they belong. In a country where there are numerous varieties of religious belief, it is impossible to give any religious instruction without offending some people. In 1870 the solution of giving undenominational Christian teaching to all was favoured. This would undoubtedly meet the wishes of the majority, who do not wish their children to be left without any religious instruction at all. But there are uncompromising minorities who, rather than allow their children to be taught any religion except their own,

Llewellyn in 1282, and the attempted conquest of Scotland. John Balliol, King of Scotland, had admitted Edward's suzerainty in return for support in his claim to the throne. He now rebelled against Edward who took that opportunity of attacking Scotland. In spite of his defeat of the Scots and the capture and execution of William Wallace, the popular Scots leader, he was able to keep only a precarious hold of the Lowlands. He died while marching N. to attack Scotland once more. Edward married Eleanor of Castile (*d* 1290) in 1254 and Margaret of France (*d* 1318) in 1299.

EDWARD II (1284-1327) succeeded his father, Edward I, in 1307. His reign was marked by a recurrence of the struggle between the barons and the Crown. The barons took advantage of his lack of administrative ability, and forced him to get rid of his advisers, Piers Gaveston, in 1312, and the Despensers, 1321, who returned from exile in the following year and endeavoured to win the support of the Commons for the Crown. In the Parliament of 1322 it was laid down that the consent of the Commons was necessary for the validity of any Act of Parliament. Robert Bruce of Scotland took advantage of these quarrels to win Scotland back, defeating the English army at Bannockburn in 1314. Edward was deposed in Jan. 1327, and a few months later was murdered in a conspiracy against him in which his wife, Isabella of France, took part.

EDWARD III (1312-1377), succeeded his father, Edward II, in 1327. He was concerned mainly with foreign politics. A dispute with Philip of France over Gascony led to the outbreak of the Hundred Years' War in 1338. The English won a series of victories—on land, Crécy, 1346, and Poitiers, 1351, at sea, Sluys, 1340. Aquitaine was ceded to Edward in 1361, though it was regained by the French later in the reign. Certain apparently protective trade regulations were introduced during his reign, but they were really part of the foreign

policy, as they were closely associated with his attempts to coerce or to educate the Flemish people. His need for funds made him rely on Parliament and strengthened the hands of the burghers and knights in the Commons. During his reign the Black Death (*qv*) occurred. He married Philippa of Hainault (*d* 1369), 1328, their 10 children including Edward the Black Prince and John of Gaunt (*qv*).

EDWARD IV (1442-1483), son of Richard, Duke of York, was crowned king after the Yorkist victory at Mortimer's Cross, 1461, owing to the influence of Warwick, the King-maker (*qv*). They disagreed, and Warwick was defeated at Barnet, 1471. He gave great assistance to Caxton, the printer, and assisted the "revival of learning." See ROYALS, WARS OF THE.

EDWARD V (1470-1483), son of Edward IV. He was imprisoned in the Tower in 1483 (the year of his accession) and, it is said, was murdered by the orders of his uncle, Richard Crookback, of Gloucester, who ascended the throne as Richard III.

EDWARD VI (1537-1553), son of Henry VIII and Jane Seymour. He was a Protestant, and came to the throne in 1546 under the influence of Protestants, his uncles the Dukes of Somerset and Northumberland. During his reign two editions of the Book of Common Prayer were issued. Several rebellions were suppressed. He was never strong physically and died young.

EDWARD VII (1841-1910), succeeded Queen Victoria in 1901. A powerful influence in foreign politics, he was called the "Peacemaker." Always a friend of France, he helped largely in bringing about the *Entente Cordiale* between Great Britain and France in 1904. This was followed by the entente with Russia in 1907. In 1909, in pursuance of his policy of conciliation, King Edward paid a State visit to Berlin, but no entente resulted, as many Germans imagined that the King's activities were part of a deep-laid scheme to isolate Germany. King

ward set the fashion followed by his foreign travel undertaken on politico-commercial objects by princes of England. As a sportsman and three times winner of the Derby he obtained the love of his countrymen.

Edward, Prince of Wales (b 1894) was christened Albert Christian George Patrick David. Heir apparent to the British throne, eldest son of King George V and Queen Mary. He was educated at the Naval colleges of Dartmouth and Dartmouth and at Balliol College Oxford. His first important public appearance was at his investiture as Prince of Wales at Caernarvon in 1911. He joined the *RMS Hindustan* as midshipman in



Edward Prince of Wales.

same year. At the outbreak of the war he went to France as a member of John French's staff. In 1918 he was appointed to the staff of the Royal Officer in Command of the Mediterranean Expeditionary Force. In 1917 he visited the scene of Austro-Italian hostilities. This developed into a man of great vitality and temperament peculiarly attuned to the spirit of his nation and the nation became only aware of the charm of the Prince. It was not long before the

Commonwealth and the rest of the world recognised the tact, good humour and sportsmanship of the heir to the British throne. The year 1919 saw the first of his long voyages abroad when he visited Canada and the United States arousing as much enthusiasm in the republic as in the imperial country. While in Canada he paid his first visit to the ranch at Calgary which he owns. In March of the following year he undertook a more ambitious tour to Australia and New Zealand covering many thousands of miles and performing scores of public ceremonies before he returned in October to be welcomed with great enthusiasm by the London populace. In 1921 he set out again this time for India and Japan where Asiatic millions proved equally susceptible to the attraction of the heir to the British throne. The intense public interest aroused by his activities probably reached its climax during this tour. Warm receptions accorded to him at its every stage were described and illustrated in every newspaper and periodical together with every available detail of the less public and more personal aspects of his daily life. On his return home in June 1922 the British public welcomed him back with extraordinary fervour. In the same year he was created a Knight of the Thistle.

While manifesting an indefatigable capacity for performing public duties many of them irksome and monotonous he had by now identified himself with the interests and standards of post-war life. Sport and dancing were chief among the princely recreations and his predilection illustrated both his capacity for spontaneous democratic gestures and his affinity with the pursuits engaged in by the majority of his contemporaries. He became an arbiter of fashion and any deviation however small from normal dress initiated by him instantly became a sartorial institution. Fox hunting and golf are his favourite recreations.

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water but unlike the salmon it breeds in the sea generally at great depths. The young soon after hatching turn into a transparent glass like fish with a small head large eyes and a deep compressed body quite unlike the parent in appearance and long believed to be a distinct fish. Gradually these larvae develop becoming smaller in the process into little eels known as elvers and in the spring when they are apparently about a year old the elvers ascend rivers in large numbers being then called eel fares. Nothing stops their progress upstream and they have been known to leave the water and crawl over damp grass to avoid waterfalls or rapids they cannot surmount. They stay in fresh water until grown to 3 ft or so in length but salt water seems necessary for the attainment of sexual maturity. Hence in the summer or early autumn they descend to the sea to breed an eel that has once left a river never returning to it.

Effervescence the rapid escape of gas from a liquid usually due to chemical action as in the mixing of a solid powder with water. The evolution of carbon dioxide when soda water is drawn from a syphon is not a chemical effect but is due to relief of pressure.

Efficiency in technical work the percentage of useful results obtained by any apparatus as compared with that theoretically obtainable. Thus the efficiency of a boiler is the ratio of the heat supplied to the feed water and appearing in the steam produced as compared with the total caloric value of the fuel burned. A boiler works with an efficiency of 60-80 per cent. The efficiency of an electric motor is given by the percentage ratio of the power delivered by it to the theoretical maximum corresponding to the electrical power which it absorbs the loss appears entirely as heat. The electrical efficiency of a dynamo is given by the electric power which it delivers at its terminals as compared with the mechanical power

used to drive it. In these cases the efficiency varies from 50 per cent in a very small machine to 98 per cent in a large one. The efficiency of heat engines is governed by the law of thermodynamic (q_1) Heat taken in at one temperature and discharged in part at another the theoretical efficiency possible being given by the difference between these two temperatures multiplied by 100 and divided by the first of the temperatures (10 degrees absolute).

In the case of the steam engine the two temperatures are those of the boiler and the condenser in the case of the internal-combustion engine those of the gases on explosion and of the exhaust. In the case of heat engines we speak of the overall thermal efficiency which includes in the case of the steam engine the loss in the boiler. The best piston engines have an efficiency of c. 17.5 per cent. large turbines c. 20 per cent. and the Diesel engine 35-45 per cent. It will be seen that the efficiency of steam-engines is greatly increased by raising the temperature of the boiler and therefore the pressure of the steam and by superheating the latter. The efficiency of large water turbines is exceedingly high 95 per cent having been reached. In the ordinary motor car engine the efficiency may be c. 22 per cent.

Effigies, sculptured figures on sepulchral monuments of which those of the crusades to the Temple Church, London are among the best known in England. One characteristic medieval effigy after the 12th cent. was a figure in low or high relief lying on the top slab of a sarcophagus. Formerly figures had usually been sculptured erect. Of the Italian Renaissance period the finest examples are Michelangelo's magnificent tombs of the Medici at Florence. Later sepulchral effigies were more imaginatively conceived especially French effigies of the 17th and 18th cents.

Efflorescence (chem.) the converse of deliquescence (q_2) the pheno-

In 1925 he visited S Africa and S America, going again to the latter country with Prince George in 1931 to open the Anglo-Argentine Exhibition at Buenos Aires. While in Africa in 1928 he made a spectacularly swift return to his father's bedside, becoming one of the Counsellors of State appointed during the King's illness. The adventurous trait in his character is to-day manifested in his interest in and practical encouragement of aviation, while his more serious preoccupation with social problems is proved by his visits to the stricken coal fields in 1929 and to the N industrial towns in 1933, when a valuable stimulus was thereby given to welfare schemes for the unemployed. In the same year a summary of his varied activities up to the present time was made available by him to the public in a film whose profits were devoted to charity—a striking example of the close and mutual interest of the prince and the people. The Prince has been a prime mover in a campaign against slums, and in a successful effort to keep the countryside free from ugly hoardings.

Edward, Prince of Wales (1330–1376), *see* BLACK PRINCE, THE

Edward the Confessor (c 1010–1066), King of England, son of Æthelred the Unready, succeeded Hardicanut in 1043. His advisers were Norman, and their assumption of power was contested by the English earl Godwin, and his son Harold, who eventually prevailed. William of Normandy, to whom Edward is said to have promised the throne, visited England during his reign. Edward was of deeply religious character. In 1050 he began the building of a new abbey at Westminster, which was consecrated shortly before his death.

Edward the Elder (d 924), King of the Angles and Saxons, second son of Alfred the Great, whom he succeeded c 900. Edward strengthened his rule by a succession of victories over the Danes between 905 and 914, and in 919 received the homage of the

Scottish, Northumbrian, and Welsh Kings.

Edward the Martyr (c 963–978), King of the English, succeeded his father, Edgar, in 975. He was murdered at Corfe Castle, Dorsetshire, apparently at the instigation of his stepmother, Ælfthryth.

Edward, Lake. Lake partly in Uganda and partly in Belgian Congo, 3000 ft above sea-level, with an area of over 800 sq m. It is one of the main sources of the Nile, overflowing by the Semliki into Lake Albert. H. M. Stanley, who discovered the Lake (1889), called it Albert Edward Nyanza, by which name it was long known. The surroundings of Lake Edward, with its lesser neighbour Lake George, are wild and imposing, with Ruwenzori dominating the N distance. Length, 44 m, greatest breadth, 32 m.

Edwards, John Passmore (1823–1911), newspaper owner, journalist, and lecturer. Of poor parentage, he came to London in 1845 and worked for social reforms, such as early shop-closing. He founded his first journal in 1850 and purchased the *Echo*, the first halfpenny newspaper, in 1876. He amassed a large fortune, which he devoted to the establishment of free libraries and other institutions, twice declining a knighthood in recognition of his philanthropic work.

Edwards, Jonathan (1703–1758), American Presbyterian minister. His teaching offended his congregation at Northampton, Mass., and he was asked to resign, later becoming President of New Jersey College, now Princeton University. Among his many important writings are *The Freedom of the Will* (1754) and *The True Nature of Christian Virtue*.

Eel, a name for several distinct kinds of fishes, including the conger (*qv*), but usually applied to the common edible species found in the N Atlantic Ocean and the Mediterranean Sea and the rivers that flow into them, but not in the Black Sea. Like the salmon, this eel lives both in fresh and salt

water but unlike the salmon it breeds in the sea generally at great depths. The young soon after hatching turns into a transparent glass-like fish with a small head large eyes and a deep compressed body quite unlike the parent in appearance and long believed to be a distinct fish. Gradually these larvae develop becoming smaller in the process into little eels known as elvers and in the spring when they are apparently about a year old the elvers ascend rivers in large numbers being then called eel-fares. Nothing stops their progress upstream and they have been known to leave the water and crawl over damp grass to avoid waterfalls or rapids they cannot surmount. They stay in fresh water until grown to 3 ft or so in length but salt water seems necessary for the attainment of sexual maturity. Hence in the summer or early autumn they descend to the sea to breed an eel that has once left a river never returning to it.

Effervescence, the rapid escape of gas from a liquid usually due to chemical action as in the mixing of a seidlitz powder with water. The evolution of carbon dioxide when soda-water is drawn from a syphon is not a chemical effect but is due to relief of pressure.

Efficiency in technical work the percentage of useful results obtained by any apparatus as compared with that theoretically obtainable. Thus the efficiency of a boiler is the ratio of the heat supplied to the feed water and appearing in the steam produced as compared with the total calorific value of the fuel burned. A boiler works with an efficiency of 60-80 per cent. The efficiency of an electric motor is given by the percentage ratio of the power delivered by it to the theoretical maximum corresponding to the electrical power which it absorbs the loss appears entirely as heat. The electrical efficiency of a dynamo is given by the electric power which it delivers at its terminals as compared with the mechanical power

used to drive it. In these cases the efficiency varies from 50 per cent in a very small machine to 99 per cent in a large one. The efficiency of heat engines is governed by the laws of thermodynamics (*qv*). Heat is taken in at one temperature and discharged in part at another the theoretical efficiency possible being given by the difference between these two temperatures multiplied by 100 and divided by the first of the temperatures (in degrees absolute).

In the case of the steam engine the two temperatures are those of the boiler and the condenser in the case of the internal-combustion engine those of the gases on explosion and of the exhaust. In the case of heat engines we speak of the overall thermal efficiency which includes in the case of the steam-engine the loss in the boiler. The best piston engines have an efficiency of c. 17.5 per cent large turbines c. 20 per cent and the Diesel engine 35-45 per cent. It will be seen that the efficiency of steam-engines is greatly increased by raising the temperature of the boiler and therefore the pressure of the steam and by superheating the latter. The efficiency of large water turbines is exceedingly high 95 per cent having been reached. In the ordinary motor car engine the efficiency may be c. 10 per cent.

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In 1925 he visited S Africa and S America, going again to the latter country with Prince George in 1931 to open the Anglo-Argentine Exhibition at Buenos Aires. While in Africa in 1928 he made a spectacularly swift return to his father's bedside, becoming one of the Counsellors of State appointed during the King's illness. The adventurous trait in his character is to-day manifested in his interest in and practical encouragement of aviation, while his more serious preoccupation with social problems is proved by his visits to the stricken coal fields in 1929 and to the N industrial towns in 1933, when a valuable stimulus was thereby given to welfare schemes for the unemployed. In the same year a summary of his varied activities up to the present time was made available by him to the public in a film whose profits were devoted to charity—a striking example of the close and mutual interest of the prince and the people. The Prince has been a prime mover in a campaign against slums, and in a successful effort to keep the countryside free from ugly hoardings.

Edward, Prince of Wales (1330-1376), see **BLACK PRINCE, THE**

Edward the Confessor (c 1010-1066), King of England, son of Æthelred the Unready, succeeded Hardicanut in 1043. His advisers were Norman, and their assumption of power was contested by the English earl Godwin, and his son Harold, who eventually prevailed. William of Normandy, to whom Edward is said to have promised the throne, visited England during his reign. Edward was of deeply religious character. In 1050 he began the building of a new abbey at Westminster, which was consecrated shortly before his death.

Edward the Elder (d 924), King of the Angles and Saxons, second son of Alfred the Great, whom he succeeded c 900. Edward strengthened his rule by a succession of victories over the Danes between 905 and 914, and in 919 received the homage of the

Scottish, Northumbrian, and Welsh Kings.

Edward the Martyr (c 963-978), King of the English, succeeded his father, Edgar, in 975. He was murdered at Corfe Castle, Dorsetshire, apparently at the instigation of his stepmother, Ælfthryth.

Edward, Lake. Lake partly in Uganda and partly in Belgian Congo, 3000 ft above sea-level, with an area of over 800 sq m. It is one of the main sources of the Nile, overflowing by the Semliki into Lake Albert. H. M. Stanley, who discovered the Lake (1889), called it Albert Edward Nyanza, by which name it was long known. The surroundings of Lake Edward, with its lesser neighbour Lake George, are wild and imposing, with Ruwenzori dominating the N distance. Length, 44 m, greatest breadth, 32 m.

Edwards, John Passmore (1823-1911), newspaper owner, journalist, and lecturer. Of poor parentage, he came to London in 1845 and worked for social reforms, such as early shop closing. He founded his first journal in 1850 and purchased the *Echo*, the first halfpenny newspaper, in 1876. He amassed a large fortune, which he devoted to the establishment of free libraries and other institutions, twice declining a knighthood in recognition of his philanthropic work.

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menon that occurs when a hydrated salt on exposure to air loses its water of crystallisation. This takes place when the partial vapour-pressure of the water vapour in the air is less than the minimum at which the hydrated salt can exist.

Eft, see **N1 wt**

Egan, Pierce, the Elder (1772-1849), author and journalist best known for *Life in London* (1821), which was immensely popular in its day. He wrote much about sport—boxing and horse-racing especially. His accounts of famous trials were widely read. He founded, in 1824, *Pierce Egan's Life in London and Sporting Guide*. **Pierce Egan the Younger** (1814-1880), his son, wrote many popular stories.

Egbert, King of Wessex (d. 839), exiled from England, sought refuge with Charlemagne, but in 802 returned to become King of Wessex. He conquered Cornwall and Devon in 813, and Mercia, Kent, Essex, Northumbria, and Wales in 830, thus becoming overlord of England. He defeated the Danes at Hengistdune in 837.

Eger (1) or **Erlau**, town in Hungary, near the Matra and Bükk Hills, amid surroundings ideal for viticulture. Other industries are the manufacture of soap, candles, and tobacco. There is a large, comparatively modern cathedral in the Italian style. The city was besieged in 1552 by the Turks and was relieved by the efforts of the women of the town, who pushed down rocks and poured boiling oil upon the invaders until they abandoned the project. Pop. 29,000.

(2) (**Czech** *Čech*), a town in S Bohemia on the frontier between Czechoslovakia and Germany. It is a growing industrial centre producing

textiles, pottery, and motor-cars. R. 27 550

Egeria [*HEERIO*], nymph in Roman mythology, who sanctified the lake Numa, king of Rome. The name is frequently applied metaphorically to female helper of some famous man.

Egg: (1) In zoology, the term for female reproductive cell of all animals in which male and female cells are developed, but popularly restricted to the female reproductive cell of birds, most reptiles, amphibians, and fish, a few mammals, and of molluscs, crustaceans, insects, spiders, etc., whether the cell be fertilised before or after being laid. (2) In botany, a female germ cell. In the simplest type of sexual reproduction two naked protoplasts (i.e. without cell walls) of similar size and structure fuse with each other. These are believed to be derived from spores, and the special cell structures in which they develop to be homologous with sporangia. However, the gametes or naked paired cells often differ in size, the larger being the female and the smaller the male. When the female gamete has no power of swimming in water, but remains in the cell, it is termed an egg-cell (or oosphere), and the motile and smaller male cell or antherozoid seeks it out and penetrates it, and the male and female nuclei fuse in process termed oögary. The egg cell mostly remains in the female sexual organ, and attracts the male by chemical substances poured out into the surrounding water. The female cell of ferns, mosses, liverworts, some few higher algae, the gymnosperms, and flowering plants is an egg or oosphere. See also **EGGS, REPRODUCTION**



